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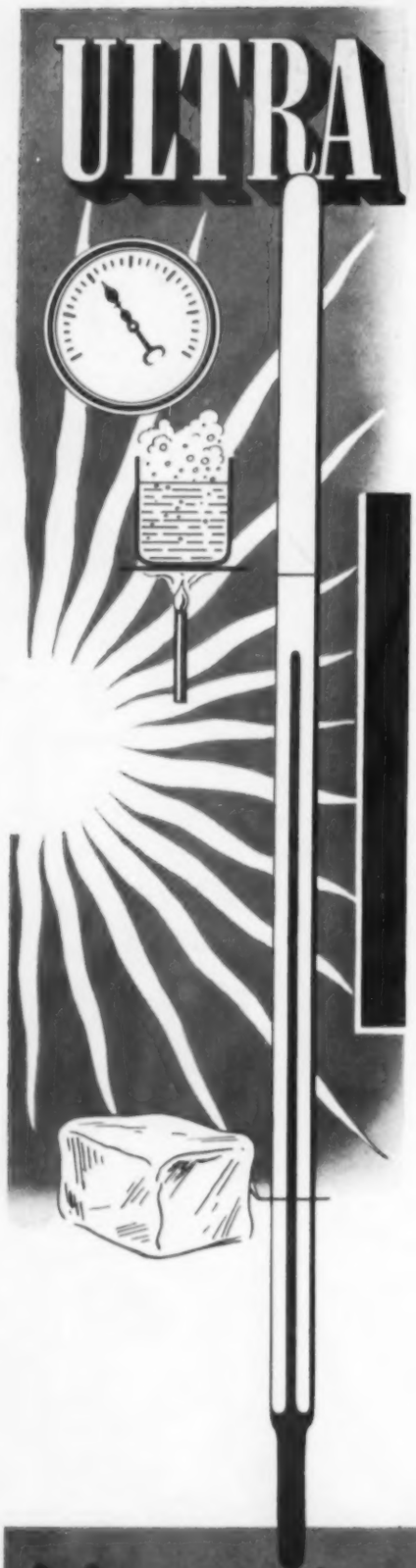

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The **RUBBER AGE**

VOL. 48, No. 1 **OCTOBER, 1940**

Chrysler's Rubber-Plastics Laboratory

By J. C. ZEDER

Chief Engineer,
In Charge of Laboratories,
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IT is interesting to note that when Charles Goodyear published his book in the middle of the last century, he foresaw practically every present day application of rubber. Today, everyone is familiar with the rubber tire, but beyond this few people have an accurate realization of the significant part that rubber plays in the construction of the modern automobile. Aside from its use in the tires, which is popularly conceived as its only important function in the car, rubber is employed in at least a dozen other different capacities representing over 250 separate parts. Rubber motor and body mountings protect the passenger from vibration and noise. Crankshaft stresses are reduced by rubber vibration dampeners. Oil seals, weather stripping, electrical insulation, and spring shackle bushings are all dependent upon the use of rubber.

Sometime late in the twenties, when automotive designers were beginning to concern themselves with the elimination of noise in the car, Chrysler Corporation engineers perceived that rubber was destined to perform a more versatile duty than merely that of a tire material. With customary foresight and pursuing a proven policy of determining specifications for every part of their products, Chrysler engineers set up a Rubber and Plastics Laboratory and began an exhaustive investigation of the properties of rubber and the possibilities of its development for new uses. Through a judicious balance of accurate control and the use of new compounds and methods, this laboratory has since maintained the lead in the development of the automotive applications of rubber.

The first accomplishment of consequence proceeding from this new laboratory was the development of adhesion motor mountings. The vibration of an engine is noticeable only to the extent that it is transmitted to the frame, and efforts to eliminate this effect led to the adoption of live rubber blocks interposed between the engine and frame. Up to this time it had been expedient to secure these blocks mechanically by means of riveting, mechanical inclusion of the rubber, or some device which permitted little flexibility of design. To obviate this disadvantage it was desired to make the rubber adhere of itself to its metal backing, and, through laboratory research, it was found that brass plating provided a satisfactory base to which rubber could be bonded.

Notable achievements which were subsequently made feasible by brass plating adhesion were the development of "floating power" and the simplification of vibration dampener design. "Floating power" was a revolutionary innovation in engine suspension, consisting only of two supports, one at each end. The two supports are so arranged that a line through them passes approximately through the center of gravity of

the engine. This system permits the engine to rotate on its own axis, a tendency which is restricted by the mass of the power plant below the mounting centerline. This two point support greatly diminishes the effects of engine vibration.

Among the rubber parts which add so much to the conveniences and comfort of the modern automobile are the door seals, which keep out heat, cold, wind, and rain to a far greater extent than even on the best construction of a few years ago. These molded sponge rubber seals are fastened to painted surfaces and adhere with sufficient tenacity so that any effort to tear them off will destroy the rubber rather than the adhesive bond. This problem was solved early in the history of the Chrysler Corporation Rubber-Plastics Laboratory, and since that time a number of applications of the general principle of adhesion worked out has been applied to dozens of different places and its use is widespread through the industry.

One of the outstanding contributions to motor car safety in the past few years has been widespread use of hydraulic brakes. Today almost every passenger car and most trucks are manufactured with this type of service brake, which depends on the fundamental principle of uniform distribution of pressure in an enclosed fluid to produce equal action at all four wheels. The vital element of this brake is, of course, the rubber seal which prevents leakage of the fluid from the system, and which maintains the efficiency of the brake at the Chrysler Corporation standard, from sub-zero temperature of the arctic to extreme tropical heat. In the successful development of these sealing cups the Rubber-Plastics Laboratory was required to develop one compound which stood both of these extremes of temperature. Their success is attested by the world-wide distribution of hydraulic brake equipped cars.

This laboratory has been particularly successful in adapting synthetic rubbers to useful functions on the automobile. The characteristics of the widely spread synthetics of being able to resist the action of mineral oil on rubber has meant that spring shackles and suspension joints may now be successfully sealed for the life of the car since they not only keep grease in these hard working parts but dust and sand out of them. Synthetic rubber is even finding widespread use in the coating of gaskets, and its use is especially beneficial in all of those places which before were difficult or almost impossible to seal. Much of the increased oil mileage in today's cars is due to the fact that these synthetic rubber engine gaskets conserve the oil supply and prevent the leaky, oil-streaked engine which was the rule only a short time ago.

Shock absorbers are now protected from dust and their fluid sealed in by synthetic rubbers, and their useful life without servicing has been increased many times; even the cooling system is coming in for its share of the synthetic products since the popular but harmful practice of adding mineral oil to the antifreeze has made it necessary to protect thermostat gaskets and other parts subjected to radiator solutions.

One of the new synthetic rubbers being milled in the Chrysler Rubber-Plastics Laboratory.

Laboratory Is Completely Equipped

The Rubber-Plastics Laboratory is provided with all equipment that is necessary in the design and making of every experimental rubber, synthetic rubber, and plastic part used by the Chrysler organization. All of the molds used in making these parts are designed by the laboratory staff, and the majority of them are made by the Engineering Machine Shop.

The mixing and processing equipment used in the formulation and preparation of rubber stocks consists of one 16-inch mill, a Banbury type mixer, a 12-inch calender, and a 1½-inch extruder. Rubber stocks are prepared in accordance with the specifications requested. In the preparation of these stocks a definite compounding and mixing procedure is followed. Ingredients for the mix are carefully weighed on a torsion type laboratory scale. The raw rubber is masticated on an open mill, the rubber, bearing to the front roll, revolving at a little under half the surface speed of the back roll. The rolls of the mill are chamber-cored for rapid cooling and heating. The compounding ingredients, which vary according to the properties desired, are incorporated in the proper sequence.

Milling temperatures are watched closely during the mix, and an accurate check is made on the batch weight immediately after the mix is complete. The batch is then returned to the mill, refined to insure good dispersion of pigments, sheeted out to the desired thickness, and stored for future use. Special stocks are mixed on the Banbury type mixer. The extruder employs a worm force feed for extruding parts such as hose and window and door weatherstrip seals.

There are three general methods now used to carry out the operation of vulcanization or curing of rubber parts. The method employed depends on the nature, size, shape, and use of the finished part. The Rubber-Plastics Laboratory is equipped to handle any type cure.

The press cure is used for all parts cured in molds under pressure, imparting definite physical characteristics to the part. This laboratory is equipped with two 12-inch double deck, two 24-inch (1 single deck, 1 double deck), and one 42-inch double deck hydraulic steam presses, and one 24-inch pot press. The double

Completeness of the Chrysler Laboratory's equipment can be visualized from this general view.

deck presses are duplicates of the single deck, having an intermediate platen which allows the curing of two separate parts at once, providing the time and temperature required for vulcanization is the same.

Open steam cures are made on articles which cannot conveniently be cured in molds, that is, tubing, rubber hose, and rubber-covered cables. The rubber, after being shaped into the desired form, is heated in an autoclave filled with steam at the required temperature. It is usual to wrap the rubber tightly with fabric or embed it in talc during the process to prevent blistering from condensed steam.

Dry heat cures are used for any rubber stock which cannot be brought in direct contact with steam.

Curing temperatures range from 150°F. to 325°F., and curing pressures from 0 to 2000 lbs./sq. in.

Rubber-to-metal parts are all classified as press cures. Metal parts to which rubber is to be bonded must first be plated, and this laboratory is fully equipped with cleaning, pickling, rinsing, and plating baths to accomplish this. All metals received are first checked to fit the mold in which the part is to be cured. The method of processing these metals is dependent on the type of metal used.

The majority of the metals brought to this laboratory are hand made of re-worked metals. The processing of these metals is very difficult. Although such metals are grit-blasted, it is sometimes necessary to put them through an exceptionally strong pickle before all the scale and dirt are removed. It is also necessary to wet-sand the majority of re-worked metals before they will plate properly. Pieces that will not brass plate directly, such as cast metal, are first copper plated.

All parts completed must be cleaned. The mold flash on rubber parts is generally cleaned by hand. The metal parts are cleaned by buffing on a wire wheel. After cleaning, necessary tests are made and the pieces are submitted to engineering inspection.

Thorough testing of raw materials and finished parts is necessary to insure close adherence to specifications. Plasticity and flow tests are made on the crude rubber. The crude rubber specimen is placed between two small heated platens each with a 1-inch diameter flat surface. A specified temperature is maintained and the flow determined by the time versus the load applied. Careful analysis must be made on all pigments used. Oils used as softeners, and solvents used in making rubber cements, must be thoroughly checked. Adhesion tests are made on all rubber-to-metal parts in both shear and tension. These parts are also tested after preliminary flexing under compression loads.

Deflection tests are run on motor mountings and vibration dampeners. Synthetic rubber parts are tested for swelling in S.A.E. No. 20 motor oil for 24 to 72 hours at 200° to 250° F., and shock absorber seals are similarly tested in shock absorber fluid. Changes in

the physical properties of rubber under the deteriorating influence of air at specified elevated temperatures and pressures are also checked. Another test consists of exposing rubber specimens to sub-normal temperatures of as low as —40° F. for a period of about six weeks to determine the tendency of the rubber to harden under such conditions.

Aging tests are made in air ovens and ozone chambers. The tendency of rubber to elongate with time when under tension—known as creep—is checked at controlled temperatures of —10° F., 70° F., 130° F. and 158° F. Hardness is determined by measuring the penetration of a needle point into the surface under a specified load and tensile strength is measured in a tensile test machine.

This laboratory is also equipped for compression molding of plastics for which any of the five vulcanizing presses can be used. The laboratory also possesses a six ounce injection molding machine used in plastic development work. Both thermoplastic and thermosetting materials are molded into parts such as the glove box door, instrument panel decorative parts, control knobs, door and window regulator knobs, electrical insulators, and many other applications.

In compression molding, the positive type of molding is used in which the exact amount of plastic powder is weighed out prior to the start of molding an article. The mold is pre-heated to the specified molding temperature as different plastics require different molding temperatures. After the mold has been warmed, the weighed charge is placed into the cavity of the lower half and closed with the top half of the mold. Then the mold is pressed between the platens of the press as soon as enough time has elapsed for the plastic to become softened and flowable.

The hydraulic presses are operated from a high and low pressure line. This double system permits the use of low pressure from the city water line for a preliminary squeeze with a follow up from the high or accumulated pressure line to fully close the mold. The use of the low pressure saves wear and tear on the molds by allowing the material to soften the flow somewhat before the application of the final pressure.

Line pressure is maintained by a 4½ g.p.m. vertical tri-plunger pump, and also by a 13½ ton dead weight accumulator. A steam compressor is used to boost steam pressure from 82 lbs./sq. in. to any desired pressure up to 200 lbs/sq. in.

The laboratory machinery is supplemented by equipment for general experimental work, and there are complete plating equipment and spray booths for applying spread-on adhesives and sound deadeners. A large electrically-heated oven is also used for general utility purposes.

Immediately off the general laboratory room and adjacent to the mixing room is the organic chemical laboratory where not only rubber and plastics research goes on but also that work which is ordinarily not covered in the Metallurgical or Fuel and Oil Laboratories.

The function of the Chrysler Corporation Engineering Department Rubber-Plastics Laboratory as reflected in its wide range of equipment facilities is twofold. The laboratory is intended to carry out an exhaustive research and development program not only to keep up with trends in the industry but to take the lead in finding new uses for rubber and plastic parts and to find better methods and material for present applications. To supplement this program it is necessary to maintain a constant check of factory produced rubber and plastic parts. Physical properties of these parts are originally specified by the laboratory from the data accumulated in their development, and continued accuracy of these specifications is assured by regular laboratory examination of production samples. Correct production procedure in the installation and use of specified parts and adhesives is developed by the laboratory and continually checked by it during the production year.

The unique feature of the laboratory, however, lies in the accurate liaison it sponsors between engineering and production. The complete facilities provided make it possible to check the design and iron out production kinks before the part is sent out to be made in the plant. This procedure has reduced the time necessary to set up a plant for production from an average of six weeks to sometimes less than one week. Almost every rubber part used in Chrysler Corporation cars and trucks is actually made in the Rubber-Plastics Laboratory before samples are requested from outside vendors. An important factor in this work is of course the mold design and development which accompanies the experimental manufacture of the part.

The laboratory has already gone far into the possibilities of rubber and plastics, and is developing new materials and new processes to be added to the list of Chrysler Corporation engineering achievements.

Opalwax—A New Synthetic Wax

A NEW synthetic wax, called Opalwax, which is finding application in the rubber and other industries as a substitute for Montan and other imported waxes, was recently introduced by the Ammonia Department of E. I. du Pont de Nemours & Co., Inc., Wilmington, Delaware. It is comprised principally of 12-hydroxy stearin (glyceryl trihydroxystearate) produced by the catalytic hydrogenation of castor oil and combining unusual physical and chemical properties. It is practically odorless, pearl-white in color, has an apparent specific gravity of 0.98 to 0.99 at 20° C., is extremely hard, and has an acid number of less than 2.0.

Opalwax is extremely insoluble in solvents. None of the common solvents has been found to dissolve as much as 2% Opalwax at temperatures up to 30° C. Toluene, carbon tetrachloride and carbon bisulfide are the most effective. The synthetic wax is dissolved with severe discoloration by concentrated sulfuric acid. It is disintegrated and in part dissolved by concentrated nitric acid. In the rubber industry it is finding special application in the production of rubber coated fabrics.

Some Recent Fiber-Latex Developments

By M. C. TEAGUE

General Development Division, United States Rubber Co.

In an address before the New York Section of the American Association of Textile Chemists and Colorists on April 26, 1940, the author discussed the development of a number of new fiber-latex combinations, some of them disclosed for the first time. The following article is based upon that address, which, in its original form, appeared in the August 19, 1940, issue of the "American Dyestuff Reporter."—THE EDITOR.

IT IS to be my pleasure to discuss some new Fiber-Latex developments. By that I do not mean a review of more or less known latex applications in the textile field, but rather a description of recent specific progress. These new developments indeed look very promising, but in order for them to serve the purpose intended, they must first withstand both a direct and cross examination.

How many of my readers would like to sleep on a Cactus plant? You have to guess at the answer, but I have it. Every night I sleep on a mattress containing a large proportion of fibers from the Cactus plant. Long ago some one prepared fibers from leaves of the century plant and long ago some one brought latex from the Far East, but recently both these fibers and the latex have been further processed, united and welded. That sounds simple, but it has not been so simple technically. For several years it has taken the closest cooperation between the fiber and latex experts.

This combination product is permanently resilient, has a high fatigue resistance, is substantially sagless, odorless, light in density and color, and has further advantages over similar hair products, not to forget a lower price. Called "Tulatex," its manufacture has been standardized on a full production scale. Its use in mattresses and furniture is growing very rapidly and its use in some 1941 model automobiles is certain. These are only a few but entirely new uses for this fiber which may mean the use of millions of pounds.

Keeping Fabric Shoes Clean

Next, let us consider fabrics, those chiefly of wool, cotton and rayon. There is one problem in the fabric field which has never been solved, that is, the production of a fabric which would look and feel like a fabric but which would not be soiled by dirty hands. Because of the negligence of the fabric industry to this detail we have had to do something about it.

The textile manufacturers are constantly seeking larger outlets for fabrics and in the shoe industry their efforts have been well repaid. In this industry we find an increasing amount of fabrics used. Many new ones have been developed—light and beautiful colors, interesting weaves and surface effects. But did you ever see a shoemaker with immaculately clean hands? If you did, he was certainly an exception. It is true that some light color suede leathers are also easily soiled but this problem of keeping shoes clean during manufacture or cleaning them afterward to make them saleable has increased in importance many fold as the result of the greatly increased use of fabrics in shoes.

As those who work or experiment with latex can testify, when latex gets on one's clothes it is there to stay. After the fabric has worn out the rubber will still be there. Yet in this problem of keeping fabric shoes clean we propose to deliberately "ruin" the fabric by spraying latex all over its outer surface; then to have the shoes made by the customary dirty hands, and finally to say the secret word or go through a special daily dozen and have the latex film to easily, completely and cleanly free itself from the fabric. This problem is an old one, but its commercial solution is quite new.

Considerations in the Process

I could make it sound simple by saying that we merely treat the fabric first so that the latex film will be easily removed, but that would be one of those misleading statements that express the truth but by no means the whole truth. Let me enumerate some of the necessary considerations in this process. The pre-treatment of these fabrics is usually acidic, but it must not affect the color of the fabric. The shoe fabric is usually backed by another fabric by means of cement. The pre-treatment must not cause this cement to stain the fabric and it must not decrease the adhesion of the two fabrics. If the under fabric contains rubber threads, the pre-treatment must not injure them. It must permit some but not too much adhesion of the subsequently applied latex rubber film.

As to the latex film, if it is the normal latex film it will not be satisfactory. It must be a latex processed especially for this work—it must spray satisfactorily, it must be used in the right amount, applied under the correct spraying technique, it must not stain the fabric. All of the above pre-treatment considerations must be reconsidered in respect to the latex.

Much progress has been made during the past two years. This has been in the development of a satis-

factory pre-treatment of the fabrics, of satisfactory latex preparations, improved coating and spraying technique, the solution of color and staining problems, and development of improved mechanical devices. There has resulted a satisfactory commercial use of the process in some portions of the shoe industry. For white shoes and some others, the process is now regularly used in a number of factories and hundreds of thousands of pairs of such shoes have been protected during manufacture.

Combining Rubber and Textiles

We next come to a development or family of developments which consists of new methods of combining rubber and textiles. There would be little interest in a new raincoat fabric or rubberized sheet, but there is definite interest in such a combination of rubber and textiles as will retain the fabric properties and are, in fact, improved fabrics. I will first review some of the technical phases and then discuss some of the unusual results which may be obtained.

The types of rubber used in all cases are latex preparations which have been developed with properties appropriate for the intended uses. In other words, these latex preparations consist essentially of colloidal particles of rubber suspended in water to which have been added aqueous dispersions of other substances and some chemicals, but balancing the whole so as to have the desired stability.

The latex preparations in which we are most interested are iso-electric dispersions. Dispersions of colloidal substances generally owe their stability, that is, their inability to settle out or coagulate, to the presence of electrical charges carried by the particles of the disperse phase. There is, however, a region of hydrogen ion activity where the positive and negative charges of the dispersed particles are equal to each other and where the charges on the dispersed particles are neutralized. In our solutions, the region of electrical neutrality is called the iso-electric range and particles in this range have no charge. Consequently, our iso-electric bath is composed of uncharged rubber particles of other substances suspended or dissolved in water.

Not only is this latex iso-electric but it is also a stable colloidal dispersion. Furthermore, by the proper use of certain chemicals, that is, protectives and surface active agents, the iso-electric pH can be shifted within wide limits so that the latex preparation can be adapted to a wide variety of operating conditions. When a fabric is kept in contact with such an iso-electric latex bath the dispersed particles deposit in the fabric without film formation and the bath exhausts. As in dyeing, there is a saturation limit for any given fiber. The saturation of a fiber for the discrete particles of our latex bath depends upon the fiber itself, its cleanness, the chemicals in the bath, and the time, temperature and intimacy of contact.

However, since the treating bath is stable, it cannot coagulate under the conditions of treatment and, since the bath composition is iso-electric and contains no charged particles that will be attracted by and coagulated upon the surface of an electrically charged body, the deposition of colloidal rubber particles in the fabric is non-coagulative. In other words, with respect to the fabric and the suspended rubber particles, it is not a violent case of love at first sight but rather a preliminary through acquaintanceship developing into a sincere affection for each other. Such a union of fabric and rubber particles we shall term "sorption" and, in this case, sorption comprises a wet set as heat is not required and as the fabric may be freely rinsed without loss of deposit.

The new latex preparations may be applied to fabrics by spreading, immersion, padding, suction, spraying and similar technique. It is customary in different mills to use "long baths" for processing textiles, where the bath to goods ratio may be from 5:1 to 40:1. For example, some silk fabrics may be dyed from a bath which is 25 times the weight of the load. Our latex baths may be used similarly, so that exhaustion of a 0.5% concentration bath at 25:1 ratio should increase the weight of the silk 12½%.

The question of the relative amounts of goods and bath discloses a mill difficulty. In handling fabrics which are roped, the dyeing and wet finishing steps sometimes result in uneven shades and mill marks of a serious nature. These troubles may be even more serious where the treating substance is not in solution but has a definite particle size, as is true in our case. Where such troubles are encountered, we use a simple and fool-proof method for processing with a low bath to goods ratio, an amount of bath less than the wet saturation of the fabric; in other words, a ratio of approximately ½:1 or 2:1.

Suppose, for instance, we wish to process a cut of woolen fabric to obtain an increase in weight of 15%. The cut of fabric should be run in the flat through a 15% concentration bath of any reasonable quantity, the fabric leaving the bath containing approximately seven times its weight of this bath. It should then be passed through squeeze rolls or over a suction device or extracted in a centrifugal basket to remove the excess. Leaving the removal apparatus, the fabric should contain one pound of bath per pound of fiber and this bath should exhaust upon the fiber just as in the case of the 25:1 bath. In other words, we would be using a bath to goods ratio of 1:1 by having the fabric contain all of the treating bath.

Applications of the New Processes

So much for the present as to the purely technical considerations. We have these new related flexible processes. How can we use them? The following concrete, only a few of the many, examples should prove illuminating.

Auto Fabrics: Automobile manufacturers are interested in better fabrics and cheaper fabrics. Several thousands of yards of flat automobile upholstery fabric, that is, wool fabrics but containing varying amounts of cotton, have been prepared using an iso-electric latex compound in accordance with the method described above. These fabrics, containing approximately 7½% of latex solids on the weight of the fabric, showed a 10% gain in tensile strength and a gain in abrasion resistance of 100%.

A country-wide service test of about 60 automobiles upholstered with these improved fabrics confirmed that the processed fabrics had twice the life of the same but untreated fabrics. In these service tests fabrics already being used were treated and tested. In other words, however, new fabrics were designed to show a lower net cost of the treated fabrics and as compared to the so-called standard untreated fabrics.

These less expensive fabrics also showed approximately 100% improvement in wear as compared to the standard untreated fabrics.

Blankets: Much attention has been given to the treatment of blankets, that is, bed blankets. One hundred and sixty blankets of the institutional type, *i.e.*, of the type generally used in hospitals, have been treated so as to contain 12% of the latex solids. These treated blankets showed notably 50% increase in tensile strength and 50% increase in resistance to abrasion. One of the most valuable findings, however, was that the treated blankets were substantially shrinkproof and did not felt. On repeated laundering, these blankets showed a maximum loss of only 10% in area as compared with the usual 40%. Blankets wear out by being cleaned, that is, the fibers are only loosely held in the conventional blanket and on being cleaned many of these fibers are lost. These treated blankets, however, showed a maximum loss on repeated laundering of only 8% in weight as compared to the usual 20%. These treated blankets also had an improved nap, that is, instead of a long loose nap they had a short but full and uniform nap. They also had excellent resistance to the attack of moths.

In other words, the processing of the institutional blankets under discussion resulted in a heavier and stronger blanket which would wear longer and for its entire life would be serviceable because of being essentially shrinkproof and mothproof. All of these treated blankets, along with the same but untreated ones, are now in extensive service tests. Some, but less, work has been carried out on other grades of blankets and felts.

Flannels and Suitings: Another type of fabric to which we have applied this process has been flannels. On these we deposited approximately 12% of the latex solids on the weight of the fabric and they showed an increase of 10% in tensile strength and about 100% in resistance to abrasion. They also showed good moth repellency. Samples of suiting and top coatings have been treated and suits and overcoats will be made from these fabrics and used for service tests. A good deal of work on these fabrics, however, is still in the experimental stage.

To go further with the application of this process to clothing, I shall now discuss socks—cashmere, wool and wool-cotton socks. We were very much interested in reducing the shrinkage. In tests with cashmere socks the shrinkage was 25% and 4%, respectively, for those untreated and those treated. The untreated socks also felted badly. Similar results were experienced with tests on all-wool socks and on socks containing varying amounts of wool. We found also that bundle goods showed a similarly reduced shrinkage. All of these socks had 12 to 20% added weight due to the treatment. The shrinkage figures given represent the estimated maximum shrinkage that would occur in a prolonged and very severe laundering test. It was also established that treated socks lasted 75% longer than the same but untreated socks and they were also mothproof. In one test three pairs of socks were cross mated, one treated and one untreated, and each pair worn until one sock failed. In each case it was the untreated sock that wore out in the heel in from 16 to 30 days and in each case there was no apparent wear in the treated socks.

The question might be raised: How long will a pair of treated socks wear? The only answer we can give at present is that after 1350 hours of wear and after 90 launderings treated socks tested continue to show no wear and no appreciable shrinkage and likewise no appreciable felting. In other words, after wearing these socks approximately 15 hours every day and laundering them every day, and after continuing this procedure for three full months, the wearer still has a good pair of socks. We doubt that anything approaching this has ever been accomplished before.

Finally, carrying this subject of wearing apparel still further, we proceed to underwear. Shrinkage of woolen underwear fabrics has been reduced from 20% for the untreated fabric to zero for the treated fabric. Mothproofness, too, has been achieved.

The inquiry will be raised as to our work in applying the described treatment to other fibers. Frankly, we became so intrigued in the results of the process as applied to wool fabrics for its many uses that the work on all-cotton and all-rayon fabrics has suffered. As yet this work has only been done on a laboratory scale and for that reason it has not been discussed here. Somewhat more work has been carried out on silk fabrics and this with promising results.

In summation, three new fiber-latex developments have been discussed: (1) a cactus fiber-latex product, which bids well to alter the manufacture of mattresses, furniture and automobile seats; (2) a shoe fabric protection process, which is making it easier for more fabrics to be used; and (3) a new process, covered by United States patents, for improving many types of wool fabrics, the use of which probably will be extended to other fibers.

New Material for Gaskets

A NEW material for cylinder-head and other gaskets has been developed in Germany to take the place of asbestos-base gaskets (asbestos being a material not readily obtainable in Germany under present conditions). It is made up of three sheets or layers of Buna and two layers of steel-wire netting, the wires of the two layers being placed at angles of 45° with each other. Wire netting and rubber sheets are vulcanized together. Where the conditions of application make it desirable, metallic edging may be applied where the gasket is exposed to high pressure.

Unlike natural rubber, which softens when exposed to high temperatures, Buna has a tendency to "tighten," and it can withstand high temperatures much better than natural rubber. Owing to the elastic nature of the rubber and the fact that the gasket is not coated with graphite, it is said to have better holding properties than conventional gaskets. The new gaskets are said to be resistant to hot water and hot oil up to 350° F., to glycol, gasoline, and leaded gasoline. They are not destroyed by adhering to the metal parts. Still other advantages are claimed for them.

Concentrated Light for the Rubber Mill

THERE are many industrial locations where general overhead lighting will not suffice. In such cases localized supplementary illumination has found wide application and acceptance. Illumination of mill rolls in a rubber plant is a good example of an area well adapted to this localized procedure.

This type of lighting, to be fully effective, requires that the lighting units be mounted in a definite location with respect to the machine, or work area, so that the correct illumination values will prevail at these points. At the same time, the fixture must be so located that enough light is provided, in the space surrounding the machine, to permit safe movement of materials.

One of the most important operations in the rubber plant is the mixing of the raw material on open mills. Seeing requirements are stringent, as the operator judges his work by the feel and appearance of the batch on the rolls.

A good example of correct localized lighting in the rubber factory is shown in the accompanying illustration. The Westinghouse RLM 48-inch twin-lamp fluorescent fixture, mounted directly above the rubber mill, provides the necessary high illumination on the mill rolls—the most important work area. At the same time there is enough light in the surrounding space to permit safe and sure incidental operations. It will also be noted that the fixture shape blends with that of the illuminated area.

The fluorescent lamp, with its readily available high illumination intensities, and situated for localized lighting, seems likely to provide a modern answer to an old problem.

DERMATITIS in the Rubber Industry

By DR. W. E. OBETZ

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Division of Safety & Hygiene,
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Which of the many chemicals used in rubber manufacturing processes are the most frequent offenders in the production of dermatitis and what are the best methods to employ to arrest their recurrence? These are two of many questions on industrial dermatosis answered in the following article, originally delivered by the author at the meeting of the Rubber Section, National Safety Council, Chicago, October 7-8, 1940.
—THE EDITOR.

INDUSTRIAL processes are continually changing. New products are being manufactured and new methods are devised for the production of various articles throughout industry. New chemicals and chemical compounds are introduced in our work shops and plants. As a result of these changes, new hazards are encountered and occasionally additional occupational diseases develop from the exposure. One of the most prevalent occupational diseases and the most important from the standpoint of the number of claims filed, is occupational dermatitis. It should be noted here, however, that a change is being made even in the name of the disease itself, for it is now called "industrial dermatosis" instead of dermatitis. Dermatoses is the name used to include all skin diseases while dermatitis is a sub-division, the term being applied to inflammatory conditions of the skin usually resulting from contact with some irritating substance.

To those of us who are interested in industrial claims and compensation for disability and medical expense, it seems that a large percentage of skin diseases are industrial. Investigators, however, advise us that only from 2% to 20% of all skin diseases are occupational in origin. When occupational diseases are classified, it is found that about 65% of all claims filed are due to occupational skin diseases. These claims seem to be scattered throughout industry and are caused by various occupations, sometimes where occupational hazards are least expected. Beauty parlors, soda fountains, restaurants, department stores and many other apparently hazardless industries very frequently find cases of dermatitis among their employees.

In the rubber industry, dermatitis has long been known to be one of the prevalent occupational diseases. A few years ago, and perhaps even yet to some extent, rubber poisoning, rubber itch and rubber dermatitis were frequently reported by employees and attending physicians wherever skin irritation was found to exist. More recently, however, physicians are required to give a more accurate description of the cases they are called upon to treat, and the reports filed are usually more inclusive and give a much better idea of the conditions under treatment.

Previously, much of the dermatitis in the rubber industry was attributed to hexamethylene-tetramine, commonly spoken of as "hex" or "hexa." More recently, the use of this chemical has been eliminated or it has been so combined with other chemicals that its irritating action has been greatly reduced. It is said that if this chemical is combined with sufficient amounts of sulfur, a reaction occurs in which a non-irritating compound results. If, however, some of the hexamethylene remains uncombined or remains in an acid reaction, formaldehyde and ammonia are liberated, thus accounting for the irritation of the skin that results from contact. It has been found that persons who have an acid reaction of the perspiration are more subject to hexamethylene dermatitis than those having an alkaline reaction.

This is but one of the chemicals used in the rubber industry. There are so many more that a list of the chemicals and their compounds looks like a chemical dictionary and when they are combined, as they are usually in the manufacture of rubber, many and various compounds and reactions result. Basing an opinion upon the experiences of those who have treated dermatitis and written articles upon their conclusions, it is probably advisable to consider all of the chemicals and compounds used in the rubber industry as being capable of producing skin diseases in persons who happen to be susceptible.

Reports that have come under our observation have shown that not only rubber compounds but even soapstone, talc, varnish, lacquers, ink used for stamping and the soap used in the wash room were found to be responsible for dermatitis. In this day of allergic reactions resulting from so many common household articles, even such as foods, spices, flour, sugar, etc., it is not surprising to find persons who are allergic to almost anything. It is generally accepted, however, that the accelerators, antioxidants and stabilizers are the most frequent offenders in the production of dermatitis. Some of our industrial physicians, however, seem to be of the opinion that solvents such as gasoline, naphtha, benzol, carbon tetrachloride, etc., are the most frequent causes of dermatitis in those cases coming under their supervision.

Classification of Causes

In order to understand the mode of action by which these causative agents produce skin disease, it might be well to give a classification of causes. In our opinion, the classification given by Dr. Schwartz *(1)* is very complete and helpful. His classification is as follows:

1. *Physical agents*—such as burns, scalds, extreme cold, friction or trauma.

2. *General irritants*—substances which will irritate any skin. Included in this list are the strong acids, alkalies, corrosives and solvents.

3. *Specific irritants*—those which do not affect every individual but may react on hypersensitive persons. Under this classification,

(a) Oils and greases—lubricating oils, vegetable oils, etc.
(b) Dyes and dye intermediates. Various aniline dyes, some of the solvents used in dyes and their products.
(c) Explosives—T. N. T., fulminate of mercury, etc.
(d) Rubber compounds, including the accelerators, hexamethylene, etc.
(e) Plants—ivy, sumac, pyrethrum, primrose.
(f) Biologic agents. These are divided into
  (1) Parasitic insects, such as may cause grain itch, straw itch, etc.
  (2) Bacterial infections; anthrax, glanders, erysipelas.
  (3) Fungus infections occurring among those who handle fruits and vegetables.
  (4) Ringworm infections occurring in barbers, wool sorters, fur manufacturers, and swimming pool attendants.

Skin Lesions

The skin which forms the protective covering of the body is usually soft and pliable. It contains oil glands which secrete an oily substance, sweat glands which produce the perspiration that aids in temperature control, nerves and nerve endings which are instrumental in perfecting our sense of touch or feeling, and hair follicles from which the hairs on the surface of the body protrude. In addition to its secretive function, the skin is also absorptive and has the ability to take up or absorb solutions or emulsions and possibly some dusts which come in contact with the skin. An example of this is the rapid development of aniline poisoning after some aniline dye is spilled upon the clothing, or a pair of shoes which has been dyed is worn before the dye has thoroughly dried. In medicine, some drugs are given by being rubbed into the skin in ointment form.

When the skin becomes diseased, the lesions are usually one of four classifications, either macules, papules, vesicles or pustules. In common phraseology, this means that the skin may be red in the form of a rash, may have small pimples raised on the surface, may have water blisters, or may have small blisters containing pus.

In industrial dermatitis, irritating dust or solutions such as acids, alkalies, plating solutions, etc., produce a redness of the skin which may become more extensive as the contact continues. Sometimes such a condition is complicated by a bacterial infection. Oils and greases are sometimes irritating, but more often produce small pustules by plugging up the pores in the skin with oil or grease that contains bacteria. The result is oil folliculitis, or what is commonly called "oil boils." Dusts or chemicals in powder form may be caustic in their action, such as lime or cement, or they may simply produce a mechanical irritation by friction and also tend to plug up the normal openings of the skin sometimes with infection.

The fat solvents, such as naphtha, gasoline, benzol, carbon tetrachloride and washing powders, dissolve the natural oils of the skin, leaving it dry, roughened and sometimes covered with minute cracks or fissures which form an ideal surface on which secondary infections may develop. Plant poisonings such as ivy, sumac and primrose, usually produce water blisters in persons who are susceptible. Some of the allergic reactions produce similar skin lesions. Various parasites, such as grain itch, chiggers, ticks, etc., burrow into the skin usually leaving a small pimple at the point of entrance. Bacterial infections are quite often secondary and it is interesting to note that pus producing organisms have been found when bacteriological examinations have been made of crude rubber. Fungus infections and ring worm quite often produce small water blisters between the toes or the fingers and these blisters rupture, leaving raw excoriated surfaces beneath.

Allergic skin reactions may result from internal or external causes. Certain foods will cause an outbreak of urticaria, commonly called hives. It has been said by some writers that much of our eczematous dermatitis is allergic in origin. In such cases the skin lesions are not always typical, and the causative agent is difficult to determine.

In a recent article commenting upon allergic reactions, Dr. Sulzberger *(2)* makes the following statement: "Given a sufficient degree of susceptibility to sensitization or a sufficient concentration of exposure, every potentially allergic substance can, on occasion, sensitize; and thus become the competent producing cause of a dermatosis. In other words, the older concept of poisons or irritants which was originally the basis of most compensation laws, led essentially to a listing of certain substances as recognized causes—to a list which included, mainly, known primary poisons or irritating substances."

It is evident, therefore, that many of the substances to which employees may become sensitized following either short or prolonged exposure are not necessarily poisons or irritants. Such substances are called allergenic or, as Dr. Sulzberger calls them, sensitizers.

Another quotation from the same article gives this information: "The present day concepts of allergy as a relatively common and basic factor in the production of occupational dermatosis leads to the conclusions, first, that no list of substances will prove adequate to encompass all the possible causal agents; and, second, that many allergic dermatoses will be attributable not to any one cause or factor but to a complex mechanism, a motley interplay of various causes and factors, some constitutional and hereditary and some acquired, some local and some systemic, some of occupational and some of non-occupational nature.

[1] Dr. Louis Schwartz, "Industrial Dermatitis and Its Prevention," National Safety Council, 1937.
[2] Dr. Marion B. Sulzberger, "Present Day Concepts of Allergy," *Industrial Medicine*, August, 1940.

"This conclusion shows that it is necessary for the industrial physician to be on the alert for remote causes of the questionable cases arising in industry, and it is possible that the sensitizing substances may be encountered in the home and, therefore, the condition would be non-industrial. Such non-industrial exposures could be due to dyes, cosmetics, toilet articles, insecticides, clothing, paint, varnishes, plants, soaps and similar substances."

In the same article a method is described in which the "sensitizing index" of a certain allergenic substance might be determined. In this manner those products most liable to result in sensitization could be determined and classified. In a similar manner, by the use of patch tests the "sensitization index" of workers could also be determined, classifying them according to the susceptibility to allergic reactions. Such a procedure is mentioned and outlined as being useful in an effort to determine which employees would be found suitable for work when exposed to chemicals or compounds known to have a high sensitizing index.

Whether or not such a procedure can be made practical has not as yet been determined, but it is known that there are some objections to the plan as outlined. The chief objection is the difficulty in reproducing by patch tests the actual working conditions to which the employee would be submitted in industry. This same difficulty has been experienced by some industrial physicians in the use of patch tests for the purpose of diagnosis. This question of sensitization is being given much consideration at the present time, and many experiments are being performed and many articles and discussions relative to it are appearing in medical literature.

Treatment of Industrial Dermatitis

The treatment of industrial dermatitis requires, first, that a definite diagnosis be made by a competent physician in order to be certain that the disease is industrial and to rule out non-industrial cases. In a large plant with 1,000 or more employees, it is only reasonable to expect that there would be many cases of non-industrial dermatitis. In one such plant, 29 doubtful cases of skin disease were encountered during the first six months of this year and were referred to a dermatologist for diagnosis. The reports submitted show that many various skin diseases were encountered; these included keloid, tinea infections, folliculitis, erythemas, psoriasis, seborrhea, urticaria, and other non-industrial diseases, as well as a few that were found to be the result of contact at work.

If the disease is found to be of industrial origin, then an effort should be made to determine the cause in order that it may be removed. In this, individual patch tests are quite often of value. The employee should be removed from contact with the offending substance by a change of employment or protected by the use of appropriate clothing. Suitable medication, such as lotions, ointments, etc., are usually prescribed by the attending physician, and in some instances, the use of the X-ray for treatment has been found very beneficial.

Claims Filed in 1939

In Ohio, most of the smaller plants engaged in rubber manufacturing are covered by state fund insurance, while several of the larger plants are self-insurers. In the state risks, a total of 41 claims were filed during the year; 18 of these claims were for industries engaged in rubber manufacturing other than tires or tubes. Seven of the 18 claims showed a loss of seven days or over, but the total time lost from all of these claims was 179 days. In 11 claims there was no loss of time. From plants engaged in the manufacture of tires and tubes, 23 claims were filed in which there was a loss of time in 12 totaling 237 days, and no lost time in 11 claims. It is evident, therefore, that there was very little loss of time as a result of dermatitis and that in 22 out of 41 claims, medical expense only was involved.

The claim in which the longest period of disability occurred was that of a young woman who was wrapping inner tubes with wax paper. The exact cause of her dermatitis was not determined, but she had several recurrences and the attending physician seemed to be of the opinion that heat was a factor. In another claim a man lost nine days because of a dermatitis which resulted from contact with varnish used in varnishing tubes. Another man lost 20 days because of a dermatitis resulting from the use of glycerin. After the cause was determined, the man's employment was changed and he returned to work.

In some of the large rubber plants where thousands of employees are in daily contact with various chemicals and rubber compounds, mild cases of dermatitis frequently occur and are treated at the plant hospital with no loss of time from their work. One of these plants has not had a compensation case of skin disease in three years. In many instances a change of employment is all that is necessary if such can be arranged. In another plant in which individual case records were available, it was found that 169 cases of skin disease were treated during the year 1939. In only two of these was compensation awarded for a loss of more than seven days. In this group of employees were 123 males and 46 females. They are employed in many departments but in most instances the skin disease was attributed to contact with some of the rubber compounds.

A summary of the claims shows that rubber compounds were given as the cause in 100 claims, tube stock was mentioned in six claims, rayon cord stock in five, and various chemicals, oil, paint, tape, etc., were mentioned in 15 claims. From the standpoint of age of the employees it is found that only one case was less than 20 years of age; 28 were between 20 and 29; 69 between 30 and 39; 45 between 40 and 49; 23 between 50 and 59, and 3 were 60 or more. It is evident, therefore, that age plays little or no part in the development of industrial skin disease, and in this particular plant the age of greatest susceptibility was between 30 and 39 years.

From the above statistics it seems safe to conclude that there are occupational hazards in the rubber industry and that there are many cases of industrial skin disease developing from contact with various chemicals and compounds used in the manufacture of rubber products. Most of these cases are very mild, requiring treatment but causing very little if any loss of time while under treatment. A small percentage of these cases are of such severity that the employees are disabled usually from several days to a few weeks and are, therefore, entitled to compensation. The period of disability seems to depend largely upon whether or not the employees can be given different work, thus

avoiding contact with the offending chemicals. A few of the cases have shown a tendency to recur if the employee is returned to the same type of work without adequate protection.

Prevention of Skin Diseases

The prevention of industrial skin diseases is dependent largely upon several factors:

(1) *Efficient methods of handling chemicals.* It is frequently observed that the handling of chemicals, especially in mixing rooms, is accomplished in such a way that there is a great deal of unnecessary exposure of the workers. This is true not only in regard to the causes of dermatitis, but also such poisons as lead, arsenic and cyanides. In the manufacture of batteries, red and yellow lead compounds are used and it frequently happens that these materials can be found scattered far and wide over the entire mixing room and pasting departments. In order to be efficient, mixing rooms should be equipped with bins or containers from which materials can be removed as nearly mechanically as possible with very little, if any, manual handling of materials or exposure of the employees. The old method of scooping materials from a barrel with a scoop or shovel should not be tolerated.

(2) *Good Housekeeping.* This includes keeping the mixing room and also the work rooms as free from dust, chemicals and debris as possible. Proper spacing of equipment together with suitable means for handling materials is a great help in keeping the workrooms clean. The use of vacuum cleaners wherever possible is a great improvement over the old fashioned brush or broom method of cleaning. In some types of employment, concrete floors which can be washed with a hose are of great advantage.

(3) *Control of Dusts and Fumes or Vapors.* Wherever possible, it is advisable to control the contamination of air by dust or fumes at the source at which they are generated. Sometimes one machine or operation is responsible for the liberation of dust or fumes which penetrate through an entire workroom. The enclosing of such a machine, with possibly an exhaust to the outside of the building, completely removes such a hazard. Sometimes an exhaust hood over a tank is sufficient to remove all irritating vapors in the area.

(4) *Personal Hygiene.* When employees are engaged in many of the operations in industry, it is impossible for them to keep clean while at work. It is necessary, therefore, that washrooms should be provided for their convenience. If a washroom is to serve its real purpose it must be large enough to accommodate the number of people by whom it is supposed to be used and be so equipped and maintained as to be acceptable to the employees. In many of our industrial plants, small, dark, dirty, inconvenient washrooms are provided and then the management wonders why they are not used. Personal cleanliness for the removal of irritating dusts, solutions or greases is one of the most important methods of preventing industrial dermatitis. The frequent removal of these irritating substances from the skin can do much to prevent skin irritation. In order to accomplish a satisfactory degree of personal hygiene in the average plant, it is necessary to have suitable washing facilities and to educate employees to the benefits to be derived by personal hygiene and in this manner secure their cooperation.

(5) *Protective Clothing.* In many operations where employees are subjected to various dusts and solutions, protective clothing is of great importance. If the hazard cannot be removed by ventilation then gloves, aprons, hoods, masks, respirators, boots and leggings are protective devices which are sometimes very helpful. In many instances the use of a rubber apron and a pair of long rubber gloves has entirely eliminated dermatitis from a plating operation. The application of a protective ointment to the exposed surface of the body is of benefit in some types of work. This ointment forms a coating over the skin which helps to maintain the normal excretions of the skin and also protect it from the irritating effects of some caustic alkali or acid. There is also the advantage in proper cleansing of the skin in that the ointment is usually soluble when soap and water are used, taking with it the accumulations with little or no skin irritation. In many plants the use of these protective ointments has met with much success.

(6) *Medical Examination.* Pre-employment examinations for the proper selection of employees is becoming more popular, especially in our large industrial plants. By this means, employees can be selected for work for which they are physically and mentally capable. From the standpoint of industrial dermatitis, care should be taken to eliminate those who show evidences of skin disease. It has been said that light complexioned persons are more susceptible to skin irritations than those with dark complexions. A person with dry, scaly skin should not be subjected to solvents, or one with an oily skin should not be subjected to work in which additional oil or grease would be encountered. Persons with certain diseases, such as diabetes, should not be employed where there is danger of skin irritation. Periodical medical examinations are also of benefit in detecting early cases of skin disease or evidence of any unfavorable reactions to any of the hazards to which the worker is subjected.

Summation of Vital Points

In summarizing, there are three points which seem to stand out as being worthy of special emphasis. First, the careful selection of employees to be placed in occupations where skin disease is likely to develop. Second, the maintenance of good housekeeping and adequate ventilation throughout the plant. Third, the benefits to be derived from personal cleanliness on the part of all employees as a prophylactic measure in the prevention of skin diseases.

A new **drum type master switch** providing 3-wire control for machine tools and other equipment is announced by Cutler-Hammer, Inc., Milwaukee, Wis. The new switch affords functions equivalent to two and three button heavy duty push button stations and is offered for use where an operating lever is preferred.

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Under the name **Photoswitch Electronic Timer T-15** a new universal interval timer, said to be extremely accurate over ranges from 1/20th of a second to two minutes, has been introduced by Photoswitch, Inc., 21 Chestnut St., Cambridge, Mass.

New Method for Making Vulcanized Latex Molds for Plaster Casting

BY ADOLPH SILVER

FIG. 1—*The first step, forming a two-inch plasteline flange on the back of the baseboard-mounted figure model.*

No process introduced in the ornamental plaster casting shop ever met with the acceptance accorded prevulcanized latex molds. Since publication of an efficient method for making these molds in the October, 1937, issue of "Rubber Age," believed to be the first such publication, latex molds have definitely proved their superiority and are rapidly relegating the glue mold to the industrial museum. Because of the widespread interest in methods of making latex molds for plaster casting we asked Mr. Silver to furnish us with data on the latest efficient methods now in use. The accompanying article is his answer.—THE EDITOR.

THE true reproduction of sharp details possible with prevulcanized latex molds has greatly improved the quality of plaster casts. At the same time the great skill and experience necessary when using glue molds is reduced to such a degree that the latex mold has found great favor even as a craft activity in summer camps. One boy scout camp reports that 750 book ends were cast from a single latex mold in six weeks by youngsters who never made plaster casts before.

Contrast this with the following: In an English publication of a generation ago is described a scene in a London plaster studio. A plaster cast is exhibited with a sign proclaiming that that particular cast was the 75th reproduction made from one glue mold, and the writer expresses his wonderment by stating that the details of the 75th cast were still clearly visible. It is not unusual to produce many thousands of casts from the same latex mold without any discernible difference between the first and last casts.

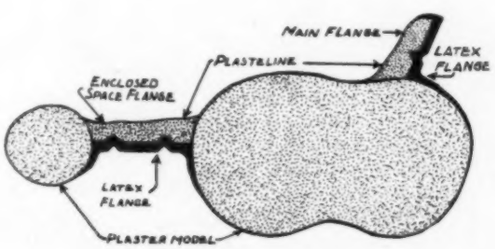

FIG. 2—*Showing the location of the several flanges which must be made.*

Not only did the latex mold raise the quality and increase the output of plaster objects, with less skill required for the casting, but its development came at a most opportune time. Until recently practically all inexpensive cast figures and plaques were imported. European conditions, however, have created a demand for domestic gift novelties of the inexpensive type, with the demand being met through the use of latex molds.

The wide and successful use of the latex mold in such a comparatively short period is very encouraging. However, as was to be expected in the early and experimental stages, the latex formula as well as the technique required further development and simplification. The latex solution now available can be used in a way that reduces shrinkage to a point where it can be entirely ignored. Nor is it necessary in order to avoid shrinkage that the latex solution be applied over small alternate spaces as before.

The length of time previously required to build up the necessary latex coating on the model is greatly reduced by the fact that the new latex solutions can be dried by heat without blowing up from the model and that by adding cotton flock to the solutions latex can be applied in paste form.

Molds can be classified in three types: (1) Open molds for bas relief or plaques; (2) Split molds for busts or figures without enclosed spaces; (3) Multiple split molds for models with enclosed spaces.

In describing and illustrating the new method the models chosen are those that would include all steps likely to be met in making any latex mold. While molds can be made on models of plasteline, porcelain or any other material, a plaster model is preferable.

No shellacking or any other preparation of the

FIG. 3—*Where additional splits are indicated by the model flanges must be provided, as shown in this illustration.*

model is required. The plaster model is cemented to a base board with burned shellac. Shellac is burned by applying a lit match to liquid shellac in a metal container. When the shellac reaches the required thickness the container is covered with a piece of metal or glass to extinguish the flame. The seam between the base of the model and base board is sealed with plasteline to prevent latex from flowing under the model.

A two-inch plasteline flange is now formed on the back of the model beginning over the highest point and running down to about three inches on the base board (Fig. 1). A "V" groove is then formed in this plasteline flange approximately one quarter of an inch away from the model. This flange will form the main split on the completed mold.

Plasteline flanges (in the model under discussion) must be placed at the spaces formed by the right arm of the figure as well as the space enclosed by the legs and model base. A "V" groove similar to the one on the main flange is formed on these flanges. These flanges are very important as they will form a split in the mold at the enclosed spaces and so release the mold from the model and from the subsequent casts (Fig. 2).

The model must now be studied to determine if and where additional splits are indicated. In this case the child's foot, being "L" shaped, would be difficult to release without an additional split at that point on the mold. A flange is therefore placed on a straight line from the toes of the child's foot to the main flange (Fig. 3).

The circumference of the child's neck being smaller than the head will form an undercut; therefore a flange to form a split is formed at this point to extend from the head to the back of the child's figure.

The model is now ready for the application of prevulcanized latex. An artist oil brush of convenient size is selected and rinsed in a weak solution of soap water to prevent the latex from vulcanizing on the brush. The latex is applied to half of the main flange and the superimposed horizontal flange. The latex must be carried to approximately over an inch on the model (Fig. 4).

The latex should be applied by flowing rather than painting and no attempt should be made to go over any small uncovered spaces until the first coat is entirely dry. After a second coat of liquid latex has been applied and well dried, two or three heavy coats of prevulcanized latex and cotton flock in paste form are painted on.

When the last application of latex is dry the horizontal plasteline flange on the child's foot is removed. If enough latex has been applied this rubber flange will keep its shape without the plasteline support. Soap solution is now painted on the rubber surface that was formed against the plasteline flange. The soap solu-

FIG. 4.

FIG. 5.

FIG. 6.

FIG. 7 *(Left)—A heavy plaster mix is applied to a thickness of 1 inch.*
FIG. 8 *(Right)—Other sections are cast until the mold is all covered.*

tion will form a separation and therefore split at this point in the completed mold.

Latex is now applied over the lower half of the main flange as well as the underside of the already formed rubber flange. All other flanges are coated with latex at the same time, and carried about one inch on the model (Fig. 5). Two liquid and three paste coats of latex are applied, allowing each coat to dry thoroughly before applying the next coat. When all applications are completed and well dried, all flanges and traces of plasteline are carefully removed. The exposed formed rubber flanges are now coated with soap solution.

The entire model as well as both sides of the rubber flanges are now coated with two coats of liquid latex. Three coats of paste latex are then applied on the parts that were not previously coated with latex paste to form an even thickness of rubber over the whole model and both sides of the flanges (Fig. 6).

The thickness of rubber necessary is determined by the size of the mold. The sixteen inch figure described and illustrated requires two additional coats of paste latex; smaller models less in proportion. The brush should be kept immersed in the latex solution while not in use and, when the mold is completed, washed in soap water. Any rubber adhering to the brush bristles can be dissolved in benzine.

Special attention should be given to the drying of each latex coating. By thoroughly drying each coat

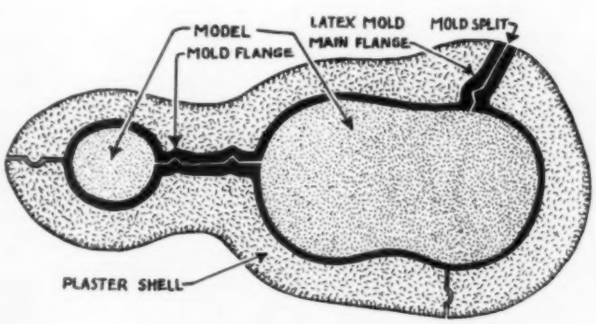

FIG. 9—*Drawing showing the method of completely covering the full mold.*

separately a sufficiently strong base is provided for subsequent coats and no lifting of the rubber from the model will occur. Under ordinary favorable conditions a coat of latex should dry in 30 to 45 minutes. With a fan blowing on the model drying can be reduced to 20 minutes, and by placing the fan in front of a moderately hot oven and blowing hot air on the model, drying can be reduced to 10 minutes for each latex coat. When sufficient rubber has been built up the mold is allowed to dry in a current of air for about 24 hours.

Before removing the rubber mold from the model it is necessary to build a plaster shell to support the mold while casting. A section of the mold on the side of the flange running the whole length of the mold is selected and separated with a plasteline flange. This section as well as the subsequent sections should cover as large an area as possible without taking in any undercuts.

A heavy plaster mix is then applied to a thickness of at least one inch (Fig. 7). When this section is set hard the plasteline flange is removed and with the tip of a spoon, or similar device, guide marks are scooped at convenient places. A strong soap solution is brushed on the plaster flange and when the soap is well absorbed a coat of sweet oil is applied. This will

FIG. 10—*The flanges are pulled apart and the mold "pealed" from the model.*

form a separation between the adjoining plaster section of the shell.

Other sections are cast until the mold is entirely covered (Figs. 8 and 9). When the last shell section is cast and set hard, the shell is tapped gently with a wooden mallet and the sections taken apart. A thin strip of rubber is cut from all extended flanges to expose the flange separation. These are gently pulled apart and the mold pealed from the model (Fig. 10). To insure a thorough curing of the inner surface of the mold it is advisable to expose the open mold for an additional 24 hours to air before making any casts.

The mold is washed with soap and water, rinsed well, and finally rinsed in a weak solution of soap water. Fourteen gage galvanized iron wire is bent to shape and fitted in parts of the mold that might require reinforcing in the finished cast. The reinforcing wires are placed in the mold except the leg reinforcing wires which are inserted soon after the mold is filled with plaster. The mold is then placed in the first section of the shell and the other sections are assem-

FIG. 11—*After assembly, the mold is secured with strong rope.*

bled around the mold in the order in which they were originally cast, and the assembled shell is then secured with strong rope (Fig. 11).

A sufficient quantity of water to approximately fill the mold is placed in a mixing bowl. Plaster is sifted through the fingers until small plaster islands appear on the surface of the water and allowed to stand about five minutes before mixing. After mixing to a smooth consistency the plaster mix is poured through one of the openings until the mold is filled flush to the mold edge. The leg reinforcing wires are then inserted in the mold and the cast allowed to set hard.

The mold should be washed with soap and water and rinsed in a weak solution of soap water before each cast. With a reasonable amount of care unlimited numbers of casts can be produced from the same mold.

For busts or other models that have no enclosed spaces only one flange is formed, usually at the back of the model (Fig. 12).

Molds for life size or larger models require a stiffer latex paste than is possible with cotton flock filler. Sisal rope should be cut one inch in length, fluffed

FIG. 12—*Only one flange is formed, usually at the back of the model, for busts or other models that have no enclosed spaces as this view indicates.*

FIG. 13—*Two coats of latex and three of latex and cotton flock paste should be applied for flat work.*

and mixed with prevulcanized latex to a heavy paste.

Molds for plaques—generally referred to as flat work—are made by cementing the plaque on a plywood board with burned shellac. The crevices between the mold and base board are then sealed with plasteline. A frame is built around the plaque model allowing a wide clearance. All corners inside the frame are sealed and rounded out with plasteline. The raw wood inside the frame is then coated with a weak soap solution. Two coats of liquid latex and three coats of latex and cotton flock paste are applied as previously described (Fig. 13). The mold is filled with mold glue and allowed to chill. A channel is cut around the edge to expose a thin edge of rubber below the level of the glue. This exposed rubber edge is wiped clean with a soft cloth saturated in turpentine. The glue surface is then coated with two heavy coats of latex paste. The rubber on the surface of the glue will fuse with the exposed rubber edge when dry. When completed the mold will be entirely covered with rubber and waterproof (Fig. 14).

In the June, 1940, issue of RUBBER AGE the author described a method of casting latex objects in plaster molds.The number of latex casts from one plaster mold being limited, quantity production of latex casts presents the problem of producing a large quantity of good plaster molds without much effort. This is accomplished by substituting a plaster negative mold that is to be cast with latex for the plaque in Figures 13 and 14 and employing the same method as used for making a latex and glue mold for plaster casting of plaques. This will result in a latex and glue positive mold. By casting plaster in this mold any number of plaster negative molds can be obtained.

FIG. 14—*When completed, the flat work mold will be entirely covered with rubber, as indicated in this drawing, and therefore should be completely waterproof.*

Editorials . . . . . .

Synthetic Rubber Stand-By Plant

ONE of the latest suggestions advanced in recent weeks with respect to what action the United States should take to assure an adequate supply of rubber in this country in the event that shipments of crude rubber from the East are curtailed or cut off is that we should construct a stand-by plant for the production of synthetic rubber. This suggestion was advanced by Jesse H. Jones, Federal Loan Administrator, who recently also assumed the post of Secretary of Commerce. Mr. Jones' suggestion was prompted by the new danger to shipments from the East presented by the German-Italian-Japanese alliance.

In connection with this suggestion, Mr. Jones passed the remark that there would be no need to embark upon such a project if there was some guarantee that shipping lanes from the Orient would always be open to us. We suspect the Federal Loan Administrator of "political fishing." Who could give us such a guarantee today? Japan? England? The Netherlands Government? England, of course, as well as the Netherlands, have the largest stakes to lose, but either is hardly in any position to put forth guarantees assuring the continuance of shipments. Japan, on the other hand, is in a position to seriously curtail such shipments, and she might possibly use that position as a lever in the future to force economic sanctions.

Construction of a stand-by plant for the production of synthetic rubber would, somewhat, place this country in a bargaining position with any nation during belligerency. But in normal peacetime it would be an idle threat since it is extremely doubtful whether production costs on synthetic rubber, irrespective of volume, could be brought much lower than 25 cents a pound, whereas the natural product, particularly under a regulation agreement, could be sold at half or even less than half of that figure. Then, too, it would cost approximately $500 per ton of capacity to build a stand-by plant.

No matter what the intent behind the Federal Loan Administrator's suggestion, however, the fact remains that plans for the immediate construction of a stand-by plant have probably been already drawn. Since the immediate future is so uncertain, with the daily headlines changing public opinion rapidly, the fact that a stand-by plant can be constructed within a reasonably short period should make any nation think twice before attempting to use crude rubber shipments as a lever in any form whatsoever.

World Rubber Absorption

THE effect of the extended British blockade, which followed Italy's entrance into the war and the collapse of France, on world absorption of crude rubber, is beginning to make itself felt—or so consumption figures for July would indicate. The rate of world absorption before the blockade was so widely extended averaged more than 95,000 tons per month, but the July figure, according to the International Rubber Regulation Committee, based largely on estimates, dropped to 74,511 tons. The drop was due almost entirely to the estimated decline in European net imports.

For the first four months of the current year, European net imports averaged approximately 24,000 tons per month. In July, however, they were down to an estimated 2,000 tons per month, this amount representing imports into Russia and Spain, with a trickle going through the Suez Canal to some of the remaining neutral countries.

The July decline was accentuated by a temporary recession in the level of rubber consumption in this country to 47,000 tons. Since then United States rubber consumption has returned to the 50,000-ton level which is likely to be kept, if not exceeded, for the balance of the year. Thus, world absorption of crude rubber for the rest of the year should average about 78,000 tons for the balance of the year, barring unforeseen further complications in other parts of the world.

CURRENT NEWS OF THE MONTH

RUBBER DIVISION, A.C.S., HOLDS ITS FALL MEETING AT DETROIT; GERKE AND STREET ELECTED TO HEAD DIVISION FOR 1940-41 SEASON

Two-Day Session in Masonic Temple Features a Special Symposium, Presentation of 14 Technical Papers, the Election of Officers, and Several Committee Reports

The annual meeting of the Division of Rubber Chemistry, A.C.S., held in Detroit, Michigan, on September 12 and 13, in conjunction with the 100th Meeting of the Society, was one of the largest ever attended. There were more than 500 members and guests present at some of the sessions, all of which were held in Detroit's spacious Masonic Temple. The meeting featured a Symposium on Rubber, Synthetics and Plastics in the Automotive Industry, the presentation of 14 technical papers, reports from the Crude Rubber, Membership, Elections and Papers Committees, election of new officers, the annual banquet, and the usual business session. From all angles, it was one of the busiest meetings held to date.

Election of officers, which took place between sessions on the second day of the meeting, resulted in the following selections: *Chairman,* R. H. Gerke (U. S. Rubber); *Vice-Chairman,* J. N. Street (Firestone); *Secretary,* H. I. Cramer (University of Akron); *Treasurer,* C. W. Christensen (Monsanto); *Sergeant-at-Arms,* C. P. Hall (C. P. Hall Co.); *Directors,* O. M. Hayden (DuPont), Bruce Silver, (N. J. Zinc), F. S. Malm (Bell Telephone Labs.). Messrs. Cramer, Christensen and Hall were incumbents. E. B. Curtis (Vanderbilt) was the retiring chairman.

The symposium, planned by the Detroit Rubber Group, of which W. G. Nelson (U. S. Rubber) is chairman; Clarence Smart (Pontiac) is vice-chairman; and E. J. Kvet (Baldwin Rubber) is secretary-treasurer, was held on Thursday, September 11. Six papers in all were presented, some abstracts of which were given in the August, 1940, issue of RUBBER AGE. The following members of the rubber and automotive industries presented papers: C. F. Smart and George W. Lampman (Pontiac); S. M. Cadwell (U. S. Rubber); L. A. Danse (Cadillac); J. C. Zeder (Chrysler); J. N. Street (Firestone); and W. M. Phillips (General Motors). Considerable discussion was held between papers.

At the conclusion of the symposium, Dr. Per K. Frohlich, Director, Chemical Division, Esso Laboratories, Standard Oil Development Company, presented the paper on "Butyl Rubber—A New Hydrocarbon Product" which he prepared in conjunction with his colleagues, E. V. Murphree, R. M. Thomas, I. E. Lightbown, and W. J. Sparks, and which he had presented before the general meeting of the Society earlier in the week. A comprehensive abstract of this paper appeared in the September, 1940, issue of RUBBER AGE. This paper, too, was the subject of considerable discussion after its presentation before the Division.

The concluding feature of the day's session was the report of the Division's Crude Rubber Committee, of which G. A. Sackett (Goodyear) is chairman. The Committee reported progress in the work of designing standard tests for plasticity determination and development of a stock for studying variation of age resistance. Methods for determining the mechanical stability of latex and for examining the cleanliness of crude rubber samples were presented.

The tentative test for latex stability is based on stirring a latex sample of specified volume under standard conditions of speed and temperature until coagulation results as determined by passing the latex through an 80-mesh screen. Alternatively, an experienced operator, using latex which is known to react suitably, may determine the end-point visually.

The test for cleanliness consists of placing a small sample of the rubber in a specified amount of equal parts of paracymene and benzol, and filtering the cement formed through a standard screen, weighing the residue obtained. The test is not parallel to or a substitute

REVISIONS TO BY-LAWS OF DIVISION OF RUBBER CHEMISTRY

(1) Section 6 to be cancelled and replaced by the following:

Section 6:

ELECTIONS. All elections shall be by secret ballot.

The Nominating Committee shall report at the Spring Meeting following which report the Chairman shall invite nominations from the floor.

A printed ballot, carrying the names of the nominees for each office arranged in alphabetical order, shall be mailed to each Member by the Secretary, at least 30 days before the Annual Meeting. The ballots shall be opened and counted at the time of the Annual Meeting of the Society by a Tellers Committee appointed by the Chairman.

The Chairman shall not be eligible for election for the ensuing year. Three of the five Directors shall be elected by The Division for a term of one year, starting at the close of the Annual Meeting at which the election is held. The outgoing Chairman and the defeated nominee for Vice Chairman receiving next to the largest number of votes for that office shall be directors for the ensuing year. No Director shall be eligible for re-election as a Director for the ensuing year. Each Member shall vote for not more than three (3) nominees for Director. The three nominees for Director receiving the largest number of votes shall be declared elected. In the event of an undecisive vote because of a tie, those nominees receiving the same number of votes shall be voted on by the Members present at the Annual Meeting until the tie is removed. In the event that there is no Annual Meeting the tie shall be removed by the vote of the outgoing Executive Committee. Officers shall take office at the close of the Meeting at which they are elected and shall serve for one year, or until their successors are elected.

Section 9, MEETING, second paragraph to read:

"Fifty (50) Members shall constitute a quorum for any Business Meeting of The Division."

Section 10, APPOINTED COMMITTEES, (A) Nominating Committee shall be changed to read:

A Nominating Committee of five (5) Members shall be appointed not later than March 1st of each year. This Committee shall select at least one (1) nominee for each office to be voted upon at the annual meeting and at least two (2) nominees for vice-chairman.

for the factory test previously given, but is intended for small sample investigation.

Friday, September 13, was devoted to the presentation of technical papers, except for the business meeting which was held between morning and afternoon sessions. Abstracts of all 14 of the technical papers presented appeared in the August, 1940, issue of RUBBER AGE. Titles of the papers, and their authors, follow:

A Study of the Nitroparaffins and Their Derivatives as Heat Sensitizers for Compounded Rubber Latices, Arthur William Campbell (Commercial Solvents); *Creaming of Rubber Latex,* E. A. Hauser and B. Dewey, Jr. (M.I.T); *Theoretical Stress-Strain and Compression Curves for Rubber-Like Materials,* Eugene Guth (Notre Dame) and Hubert M. James (Purdue); *Crystallization of Vulcanized Rubber,* Norman Bekkedahl (Bureau of Standards); *Transparency of Rubber Compounds Containing Magnesium Carbonate—II,* W. F. Bixby and H. I. Cramer (Akron University); *Effect of Various Sulfur-Accelerator Ratios in Vulcanized Rubber as Shown by a Series of Laboratory Tests,* F. S. Conover (Naugatuck Chemical).

Pliolite-Rubber Mixtures, Herman R. Thiess (Goodyear); *Vistanex Polybutene-Rubber Blends,* S. Longman (Advance Solvents); *Effect of Sulfur and Carbon Black Contents on Physical Properties of Perbunan Compounds,* C. A. Klebsattel (Advance Solvents); *Determination of Free Carbon in Rubber: The Cresol Method,* J. B. Roberts, Jr. (U. S. Rubber); *Test Formulas for Reclaimed Rubber,* Henry F. Palmer and Robert H. Crossley (Xylos Rubber); *An Immersion Test for Rubber Compounds,* B. S. Garvey, Jr. (Goodrich); *Effect of Petroleum Products on Neoprene Vulcanizates: Effect of Lubricating Oils,* Donald F. Fraser (DuPont); and *A Torsional Hysteresis Test for Rubber,* M. Mooney and R. H. Gerke (U. S. Rubber).

Dr. R. H. Gerke
New Chairman of the Rubber Division

NEW PAPERS RULES OF DIVISION OF RUBBER CHEMISTRY

I. *Submission:* Each author intending to present a paper before the Division of Rubber Chemistry shall submit to the Secretary by the usual deadline set by the Society (approximately 8 weeks before the beginning of each semi-annual convention) the title of his paper; three copies of an abstract of 200 to 250 words; an estimate of the time which will be needed for presentation, and the name of the laboratory in which the work was done.

II. *Approval:* Each paper shall be approved by a Papers Committee, consisting of the Editor of *Rubber Chemistry and Technology,* the Secretary, and a Member of the Division appointed by the Chairman, before it is placed on the final program.

III. *Publication:*

(1) Three copies of the complete manuscripts of all papers accepted for presentation before the Division shall be submitted to the Secretary on or prior to date of presentation.

(2) The author of the paper shall designate the journal to which the manuscript shall be submitted. Publication of the paper shall follow one of four procedures:

(a) Original publication, when the paper is of interest and value to non-rubber chemists, in one of three Society journals: *Industrial & Engineering Chemistry, Journal of the American Chemical Society* or *Journal of Physical Chemistry,* depending on the purport and contents of the paper.

(b) Original publication as in case (a), with subsequent publication, by release of copyright, in *Rubber Chemistry and Technology.*

(c) Original publication in *Rubber Chemistry and Technology* when the paper is of interest and value chiefly to rubber chemists, and this is agreed to by the editor of the Society journal in which the paper might otherwise be published.

(d) Direct release subject to rules of American Chemical Society to an independent publication not under the editorial supervision of the Society.

(3) The Secretary of the Division shall furnish the editor of the journal which has been chosen for publication with two copies of all manuscripts submitted. At the same time he shall transmit to the editor the names of two men, selected by the Papers Committee, to whom each manuscript may be sent for review prior to publication.

At the business meeting, the Goodyear Lecture Committee reported that several candidates for the 1941 Lecture had received consideration at a recent meeting, but no selection has yet been made. It was pointed out that nomination of candidates may be made with the Secretary of the Division up to November 15, 1940. The Committee on Nomenclature proposed that its rather lengthy report be published in *Rubber Chemistry and Technology* and a motion to that effect was adopted. The Membership Committee reported that 60 new members had been obtained since the Spring Meeting of the Division and that the membership was now more than 700. The Elections Committee suggested several revisions in the by-laws of the Division pertaining to elections. As a result, certain revisions were approved. These revisions appear on the opposite page. The Papers Committee reported that new rules had been approved by the Executive Committee relating to submission and publication of papers to be presented before the Division. These rules appear elsewhere on this page.

Approximately 630 members and guests attended the banquet, held on Thursday evening, September 12, in the ballroom of the Hotel Book-Cadillac. M. A. Clark, manager of industrial relations at the Detroit plant of U. S. Rubber, acted as toastmaster. Guest speaker for the evening was W. J. Cameron, of the Ford Motor Co., often referred to as Henry Ford's "right hand man." Mr. Cameron criticized some American business men, most politicians and the American public in general for "permitting the spirit of defeatism to permeate their systems."

Attacking the New Deal, he said "We don't need these great men with their economic short cuts across the fields of economic law. We've got to work it out for ourselves. It is not primarily the fault of this wastrel administration. It is basically the fault of the public for merely standing and looking and voting for the wrong candidates." Concluding his talk, Mr. Cameron hailed scientists as America's only real optimists, who defy the world's waste spaces. He said he had more faith in scientists than in any other group of business men.

A varied program of entertainment, of the vaudeville variety, was presented at the banquet, with music furnished by Leighton Noble and his C.B.S. Orchestra. Included among the entertainers was Bob Hall, who was instantly dubbed the "Poet Laureate of the Rubber Industry." He entertained the assemblage by reciting stories in rhyme and special poems concerning the foibles of some of the leading lights of the Rubber Division. The California Varsity Eight was another of the several attractions. The program was made possible by generous contributions from the following companies:

Advance Solvents & Chemical Corp.;

American Cyanamid Co.; American Zinc Sales Co.; Anaconda Zinc Oxide Dept. of International Smelting & Refining Co.; Baldwin Rubber Co.; Binney & Smith Co.; Carter Bell Mfg. Co.; Central Rubber Corp.; Columbia Alkali Corp.; Continental Carbon Co.; DuPont; Flintkote Co.; General Atlas Carbon Co.; General Tire & Rubber Co.; C. P. Hall Co.; Herron & Meyer; J. M. Huber, Inc.; Industrial Rubber Co.; F. F. Myers; Midwest Rubber Reclaiming Co.

Minnesota Mining & Mfg. Co.; Monsanto Chemical Co.; Moore & Munger; H. Muhlstein & Co.; Naugatuck Chemical; N. J. Zinc Co.; Pequanoc Rubber Co.; Philadelphia Rubber Works; A. Schulman, Inc.; Stamford Rubber Supply Co.; Standard Chemical Co.; St. Joseph Lead Co.; Thiokol Corp.; Titanium Pigment Corp.; United Carbon Co.; U. S. Rubber Reclaiming Co.; R. T. Vanderbilt Co.; C. K. Williams & Co.; Wishnick-Tumpeer, Inc.; and Xylos Rubber Co.

Special thanks are due to the officers and members of the Detroit Rubber Group for making the meeting the huge success it was. The Program Committee, in direct charge of preparing the symposium, was composed of J. H. Doering (Ford), W. J. McCourtney (Chrysler), W. M. Phillips (General Motors), and J. W. Temple (U. S. Rubber). W. G. Nelson (U. S. Rubber), Fred Wehmer (Minnesota Mining) and J. H. Norton (DuPont) functioned as the Entertainment Committee. Al Fuhrman (Midwest Rubber Reclaiming) was in charge of registration. Sam Adinoff (St. Clair Rubber) was in charge of industrial contacts.

VULTEX CHEMICAL CHANGES NAME TO GENERAL LATEX & CHEMICAL

The Vultex Chemical Company, Cambridge, Mass., has been reorganized and henceforth will be known as the General Latex & Chemical Corporation. The steady growth of the business is said to have necessitated the expansion of the company's capital structure.

All outstanding contracts of the Vultex Chemical Co. will be completed by the new company. No change has been made in either the personnel or previous policy.

As the new name implies, the company contemplates the extension of its services in the general latex and related chemical fields. Vultex—the prevulcanized latex—and all the materials furnished by the Vultex Chemical Co. will be continued by the General Latex & Chemical Corp.

Stamford Rubber Supply Co., Stamford, Conn., manufacturers of Stamford Factice Vulcanized Oil, celebrates its fortieth anniversary on October 20. The company has enjoyed a steady growth since the first shipment of factice was made on October 20, 1900.

STAND-BY PLANT IS URGED FOR SYNTHETIC RUBBER OUTPUT

Construction of a stand-by plant for the production of synthetic rubber to insure at least a partial supply of this essential material in the event that ship lanes from the Orient are closed to exports to the United States was favored last month by Jesse H. Jones, Secretary of Commerce and Federal Loan Administrator. At a press conference held in Washington on September 30, Mr. Jones said that if there was some guarantee that these lanes would always be open to us there would be no need to embark upon such a project. Plant construction to meet our annual consumption need for rubber would cost several hundred million dollars.

Conferences are being held by R.F.C. and defense administration officials with representatives of Goodyear, Goodrich, United States and Firestone, the DuPont interests and peroleum companies "almost every day," discussing the possibility of producing part of the country's emergency rubber needs synthetically, the Loan Administrator revealed.

Although he indicated that these discussions would continue, Mr. Jones stressed that production costs of artificial rubber, according to Defense Commission estimates, are 25 cents a pound compared with a price of 18 cents to 20 cents a pound paid by the Government for natural rubber for the strategic materials reserve stockpile. He added that estimates worked out so far show that it would cost $500 per ton of capacity to build plants for the production of the synthetic product.

Mr. Jones said that in event of serious emergency the United States might not have all the rubber it needed, but that it would be able to get by alright with the possible synthetic production and other policies that might be adopted. He indicated that the latter part of the statement related to possible restrictions on other than necessary use of the product and intensified reclaiming of used stocks.

In the meantime buying of the 417,000-ton supply of rubber which the Government plans to acquire by the end of 1941 is in full swing. Purchases so far are believed to be in the neighborhood of 60,000 tons. This is in addition to the approximate 87,000 tons to be secured from England under the cotton-rubber barter, of which approximately half has already been delivered.

The buying under the agreements between the Rubber Reserve Co. and the International Rubber Regulation Committee is in charge of a six-man committee which includes representatives of the five largest rubber manufacturers. Efforts are being made by this committee to conduct the buying in such manner so that fluctuations in the open market will be avoided.

Another announcement of interest last month was that made by an official of the Standard Oil Company of New Jersey to the effect that that company is prepared to go beyond its normal activities to assist in the national defense program. "Engineering plans for very large scale synthetic rubber production are being carried to a point where plant construction can be begun immediately in the event that the Government asks us to go into this work," this official stated. He also revealed that Standard Oil was preparing plans to increase the nation's supply of toluol.

Coming Events

Oct. 12-20. National Automobile Show, Grand Central Palace, N. Y.

Oct. 17. Buffalo Rubber Group, Hotel Lenox, Buffalo, N. Y.

Oct. 18. New York Rubber Group, Building Trades Club, New York.

Oct. 18. Chicago Rubber Group, Hotel Sherman, Chicago, Ill.

Oct. 24. Boston Rubber Group, University Club, Boston, Mass.

Oct. 27-29. Nat'l Ass'n of Waste Material Dealers, Fall Convention, Hollenden Hotel, Cleveland.

Oct. 28-30. N.A.I.T.D., Annual Meeting, Stevens Hotel, Chicago, Ill.

Nov. 5. Los Angeles Rubber Group, Mayfair Hotel, Los Angeles, Cal.

Nov. 8. Akron Rubber Group, Akron City Club, Akron, Ohio.

Dec. 2-5. American Society of Mechanical Engineers, Annual Meeting, Hotel Astor, New York.

Jan. 6-10. S.A.E. Annual Meeting, Book-Cadillac Hotel, Detroit, Mich.

Apr. 7-11. American Chemical Society, 101st Meeting, St. Louis, Mo.

June 23-27. A.S.T.M. Annual Meeting, Palmer House, Chicago, Ill.

Sept. 8-12. American Chemical Society, 102nd Meeting, Atlantic City, N. J.

Order Bata Workers to Leave

On September 26 the Department of Justice ordered 12 alien officers and 47 alien workers of the Bata Shoe Company's manufacturing plant at Belcamp, Maryland, to leave the country within a reasonable time or be deported. In discussing this action, it was made clear that Bata had obtained a blanket permit authorizing the importation of not more than 100 aliens on June 27, 1939, to train American workers in the company's special production methods. It has been found that 8 of the 47 alien workers asked to leave should have completed their instructions within 12 months and that the remaining 39 workers and 12 officers of the company and affiliated concerns were not bona fide visitors under the terms of their permits.

GOODRICH HEAD DISCUSSES STATUS OF SYNTHETIC RUBBER

Declaring that eighteen months would be required to engineer, construct, and start operation of a 35,000-ton plant for the production of synthetic rubber, John L. Collyer, president of the B. F. Goodrich Co., told a group of business leaders at a meeting of the Sales Executive Club in the Hotel Roosevelt, New York City, on October 8, that "the American public must realize the significance of this time lag before assuming that synthetic rubber offers an immediate safeguard against a possible shortage of natural rubber."

Mr. Collyer, reiterating his views expressed in answer to questions recently at a hearing before the Senate Military Affairs committee, stressed five points bearing on the rubber situation:

1. A 35,000-ton-a-year plant, the most efficient size of unit, would produce synthetic rubber at approximately 25c a pound.
2. With priorities of necessary materials and machinery, it would take at least three years to provide sufficient plant capacity to produce the synthetic rubber needed to replace natural rubber in all tires manufactured in this country.
3. With annual world productive capacity of natural rubber estimated at 1,600,000 tons—and annual world consumption averaging 1,000,000 tons—the current price of natural rubber, at approximately 20c, is an artificial price maintained by an international control agreement.
4. Due to the enormous and growing capacity of the Far East plantations and the artificial price of rubber, only "standby" plants could be justified from an economic standpoint, just as battleship and airplane programs are justified in the interest of national preparedness.
5. The Goodrich company believes that competition should be a prime factor in the government's plans to create such essential standby facilities.

Stating that in his opinion "no one can be certain whether or not, or when, our supplies of rubber from the Far East will be interrupted or completely shut off," Mr. Collyer said "we cannot be guided solely by an academic view of the situation. There is a marked difference between actual production on the other side of the world and having in our factories the right tonnage of rubber at the right time. Our government has made a thorough study of the whole rubber situation and I feel sure that action will be taken."

Reviewing the steps which have already been taken by the government to meet an emergency through the development of reserve supplies, he said that two-thirds of the 87,000 tons of rubber bartered with the British government before the outbreak of war last year for an equal value of cotton has been received and the remainder is afloat. He analyzed the nation's present rubber position, including this government-owned rubber, as "4 months' supply in this country, 3 months' supply afloat, and 3 months' supply of finished goods on hand, or a grand total of 10 months' supply."

John Lyon Collyer
addressing the Sales Executives Club

"In my judgment," he said, "this could be stretched to a year by increasing the use of reclaimed rubber. With rigid rationing of our normal uses of rubber, there could be a few more months of grace, but that would seriously affect employment in the automobile and allied industries which give employment to approximately one-seventh of our workers."

Discussing the recent agreement completed by the government and the rubber industry on the one hand and the International Rubber Regulation Committee on the other for the purchase of an additional reserve stock of 330,000 tons, he said that the plantations are now producing at close to capacity, and if all goes well, delivery should be completed within 15 or 18 months.

The most promising and practical solution of the United States' problem, he declared, is synthetic rubber for tires which account for 75% of the country's total consumption of rubber. In this connection he stressed the response which he said had greeted the Goodrich company's decision, made public in June, to offer for sale passenger tires in which Ameripol, the company's synthetic rubber, replaces natural rubber.

"Hundreds of these tires are now giving satisfactory service on our customers' cars," he said, "and the response we have had from patriotic citizens who have bought Ameripol tires for $5.00 more per tire than they would have had to pay for our natural rubber tire, has gone far beyond our expectations."

A.S.M.E. RUBBER SUBDIVISION TO SPONSOR SPECIAL MEETINGS

The Subdivision on Rubber and Plastics of the American Society of Mechanical Engineers will sponsor a series of meetings at the annual meeting of the Society to be held at the Hotel Astor in New York City the week of December 2. Two sessions are planned by the Subdivision, both on Thursday, December 5, the first at 9:30 A.M. and the second at 2:00 P.M. Both meetings will be held at the Astor.

Two papers will be presented at each of the sessions. In the morning session, W. H. Adams, of the Haveg Corporation, Newark, Delaware, will deliver a paper on "Design and Application of Phenolic Resin Asbestos Compositions in Corrosion Resistant Equipment," and J. F. Downie Smith, of the Research Division, United Shoe Machinery Corp., Beverly, Mass., will deliver one on "Rubber Springs—Compression Loading."

At the afternoon session, Ivan Gazdik and S. H. Hahn, both of the B. F. Goodrich Co., Akron, will deliver a paper on "The Creep of Natural and Synthetic Rubber Compounds in Shear," and F. L. Yerzley, of the Rubber Chemicals Division of DuPont, one on "Notes on the Creep of Neoprene in Shear." Mr. Yearzley is chairman of the Subdivision on Rubber and Plastics.

Technical representatives of companies engaged in either the production or use of rubber and plastics are invited to attend these meetings.

Strike Continues at Marathon

At this writing the strike initiated on August 31 by approximately 500 employees of the Marathon Rubber Products Co., at Wausau, Wisconsin, has still to reach a settlement. The latest development in the strike, occasioned by the failure of the union and the management to reach an agreement over a new contract, is the possibility that the union may instigate a taxpayers' suit to have the rubber factory returned to the city. Both the factory and the site were given to J. L. Usow, president of Marathon Rubber, in 1934 by the city. The union's counsel contends that the transfer of the property was illegal and has intimated that "various parties" are interested in the purchase of the factory from the city.

Stauffer Appoints Huber

Ralph B. Huber, 216 Tremont St., Boston, Mass., has been appointed sales representative for the New England territory by the Stauffer Chemical Co. Mr. Huber will handle Stauffer's complete line of heavy chemicals, including Tire Brand and Tube Brand Rubbermakers' Sulfur and Crystex (insoluble) Sulfur. Prior to becoming a manufacturers' agent in 1933, Mr. Huber was affiliated with various rubber companies as chief chemist.

CANADIAN NEWS

Although more crude rubber was imported into Canada in the fiscal year ended March 31, 1940, than in any previous year in history the current year will see all records broken again.

Perhaps no other indices show quite as clearly how modern warfare has changed as do the cold, unromantic figures of rubber imports. In the world war of 1914-18 the infantry still advanced on foot and in the twelvemonth ended March 31, 1915, Canada imported 6,500,000 pounds of crude rubber. Today not only the infantry, but the cavalry, artillery and air force ride on rubber and imports of the crude material have risen to the record breaking total of 83,700,000 pounds for the year ended March 31, 1940.

Latest figures released by the Dominion Bureau of Statistics, Ottawa, show that total imports for the first seven months of 1940 were 52,035,287 pounds compared with 36,196,076 pounds for the same period in 1939, an increase of 43.8%. It is expected that total imports for the year will go well over 100,000,000 pounds. This will be the second consecutive year since the 1929 boom that Canada has imported more rubber than it did in that famous year.

The feverish activity noted in Canadian rubber centers today is, of course, due entirely to war demands. Mechanized equipment used by the army today includes tractors, trucks, mounted guns and armored cars. These are all designed for mobility and speed, both of which mean pneumatic tires. In 1914 army equipment included a few solid-tired trucks and a few staff cars and motorcycles. Before the war ended the need of rubber for mechanical transport had increased tremendously but the total was about the same in proportion to the needs of a modern army as the import figures for 1914 are proportional to those for the last year.

The government has made such heavy demands on the rubber industry in the Dominion that few, if any, of the companies making rubber products have not shared in the government buying program. Contracts awarded to the larger companies from the first of the year through September 7 can be summarized as follows: Firestone, $1,803,901; Goodyear, $1,764,528; Dunlop, $746,584; Dominion, $326,760; Gutta Percha, $80,224; Goodrich, $74,816; Seiberling, $53,492; Miner, $48,250.

These contracts cover not only tires and tubes but also clothing and accessories, and barrack stores.

There is little tire and tube making equipment in the Dominion currently not being used at capacity. Ability of the industry to continue handling civilian needs will depend on how government business holds up. If it continues to increase as it has for the past few months, the major tire companies will either have to increase productive capacity or curtail sales to civilians.

While it is true that ordinary export business is down and exports, which are principally to Empire countries, normally represent a substantial volume, this is more than offset by orders from the governments of Australia, New Zealand, India, and South Africa. All of these members of the Commonwealth are getting large quantities of mechanical equipment from Canada.

The British government itself this month has placed in Canada an order for 23,000 four wheel drive army vehicles at a cost of between $40,000,000 and $50,000,000. Included in this total is a huge order for special heavy duty tires. An inquiry along these lines was made weeks ago by the British government. The order was definitely placed early in October and is divided among the leading companies.

It is entirely possible that Canadian rubber manufacturers will ask the Dominion government to take action similar to that of the U. S. government in building a reserve supply of crude rubber. If such a request is made it will be dictated by fear of Japanese action against Eastern rubber growing territories. Such action might result in either of two equally disastrous eventualities. Curtailment and even total elimination of shipments is one. The other is that the Japanese might produce all the rubber possible, sell at low prices and ruin the price structure which has been carefully maintained for years through joint British and Dutch regulation. In the event of the latter happening, rubber manufacturers would be exposed to severe losses through declines in crude prices. Previous experience on several occasions has taught the industry how disastrous this can be.

Hon. J. L. Ilsley, Minister of Finance, has announced that among the larger subscribers of the Dominion of Canada Second War Loan were the Goodyear Tire and Rubber Company, $250,000; Northern Electric, $250,000; and Monsanto Canada, Ltd., $100,000.

In a letter to stockholders accompanying quarterly dividend payments on October 1, president A. G. Partridge, of Canadian Goodyear, states that company sales for the first nine months of 1940 have been "substantially larger than during the same period in 1939." Payment of $0.62 on the common and $0.62½ on the preferred stock was made.

Mr. Partridge stated that increased domestic sales and orders for war requirements of the British and Canadian governments have offset the loss in export markets. "The margin of profit on such orders is, as it should be, very small and this fact, together with heavier taxation as well as higher production costs due for the most part to increased market prices of raw materials, will not permit us to show the usual percentage of profit for the year to date, which the company's increased business would ordinarily indicate," said the Goodyear head.

This does not mean that earnings have not been maintained at last year's levels but rather that the percentage gain in sales volume has not carried through to net profits. It is expected that Goodyear will exceed last year's net profit which was equivalent to $5.26 a share on the common.

New Home for United Carbon

Contracts have already been let by the United Carbon Company for its new home-office building on Kanawha Boulevard and Broad Street in Charleston, W. Virginia. The building, which will cost more than $500,000 to construct, will be streamlined. It will contain 12 stories, the ground floor being faced with polished black granite and the upper floors of gold-colored brick to bear out the company's colors of black and gold. Glass brick will be utilized for stairway lighting. Interior walls will be of gypsum block. Floors and corridors will be laid with rubber tile. The first floor will be covered in an artistic design of terrazzo. When completed, the top six floors of the building will be occupied by United Carbon and the balance will be let. It will be the finest and most modern structure in Charleston.

Automobile Show Opens

The 1940 National Automobile Show, sponsored by the Automobile Manufacturers Association, opened at the Grand Central Palace in New York City on October 12 and will continue until October 20. Eighteen makes of modern passenger cars, consisting of approximately 200 different models and chassis, are on exhibit. In addition, 40 old cars built in the early days or famous for their achievements in contests during the past four decades, are also on exhibit. Other features of the show include exhibits of accessories, parts, body work, shop equipment and safety products and displays.

General Atlas Carbon Co., 60 Wall St., New York City, is distributing its annual football schedules for the 1940 season. Copies are available without cost by writing to the company.

NEW YORK RUBBER GROUP TO MEET ON OCTOBER 18

One of the most interesting meetings ever planned will be held by the New York Group, Rubber Division, A.C.S., on Friday, October 18, at the Building Trades Club in New York City. The three winning papers in this year's Prize Contest will be presented; a paper and moving picture on "Butyl Rubber—A New Hydrocarbon Product" will be given by Dr. Per K. Frohlich of the Esso Laboratories of the Standard Oil Development Co.; the latest DuPont moving picture, "The Story of Neoprene —the Chemical Rubber," will be shown; and an after-dinner humorist will be on hand.

First prize in the Papers Contest has been awarded to John V. Weaver, of the Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc., for his paper on "Determination of Scorching of Rubber and Synthetic Compounds by Use of the Mooney Plastometer." W. J. Potter, of the R. T. Vanderbilt Co., was awarded second prize for "Exposure Tests of Stretched Vulcanized Sheets from Milled Rubber and from Latex," while third prize went to R. O. Babbit, also of Vanderbilt, for "Some General Principles of Compounding Rubber Latex.' The three judges of the contest were Harry L. Fisher (U. S. Industrial Alcohol), Emil Schwartz (General Electric) and H. A. Wakefield (Bakelite).

The paper and moving picture to be presented by Dr. Frohlich are the same as those presented before both the general meeting of the American Chemical Society and the meeting of the Rubber Division, held in Detroit last month. The paper has aroused considerable discussion and should prove of special interest. The DuPont film will be introduced by V. A. Cosler of the DuPont Rubber Chemicals Division. Tickets for the October 18 meeting, at $2.00 each, should be secured in advance from Peter P. Pinto, c/o RUBBER AGE, 250 West 57th Street, New York City, secretary-treasurer of the Group. The technical meeting will start promptly at 4:00 P.M., and dinner will be served at 6:30. Those who cannot come to the dinner may attend the technical meeting without charge. No tickets are necessary.

Executive Committee Meets

At a meeting of the Executive Committee of the Group, held on October 1, called mainly to hear the reports of the judges in the Papers Contest, Charles Haynes, of the Binney & Smith Co., chairman of the Group, appointed Arthur Nellen (Lee Tire) chairman of the Nominating Committee to select new directors and a vice-chairman for the coming year. C. A. Bartle (DuPont) and J. Miscall (Flintkote) are the other two members of this committee.

After considerable discussion on a suggestion advanced by S. G. Byam (DuPont), it was decided that the Executive Committee in the future should have at least one member from each of the following five districts: Metropolitan (New York City, Brooklyn and Long Island), North Jersey (Passaic, Newark, etc.), Trenton area, South Connecticut and Southern New York State, and Southeastern Pennsylvania.

The Executive Committee also decided that the price of non-member and guest tickets to the annual Christmas Party of the Group be twice the amount charged to paid-up members. It is therefore to the interest of those anticipating attendance at the Christmas Party that they ascertain their standing with respect to paid-up membership.

Goodyear Lecture Nominations Close on November 15

The Charles Goodyear Lecture Committee of the Division of Rubber Chemistry, A.C.S., stressed the fact at the recent meeting of the Division in Detroit that no lecturer had yet been selected for the 1941 Lecture and that nominations should be sent to H. I. Cramer, c/o University of Akron, Akron, Ohio, prior to November 15, 1940. According to the rules, nominations must be accompanied by a statement setting forth the qualifications of the nominee, with specific reference to the research on which the nomination is based. The Charles Goodyear Lecture was founded for the purpose of stimulating interest in fundamental research on rubber and to recognize those who have made outstanding contributions to the science of rubber or related subjects. The Lecturer receives an honorarium of $200.00, as well as a suitably inscribed certificate.

Boston Group to Hear Frolich

Per K. Frolich, Director, Chemical Division, Esso Laboratories, Standard Oil Development Co., Elizabeth, N. J., will repeat the address he made on "Butyl Rubber—A New Hydrocarbon" before the recent meeting of the Division of Rubber Chemistry at Detroit at the next meeting of the Boston Group, Rubber Division, A.C.S., which will be held at the University Club in Boston on Thursday, October 24. An unusual motion picture accompanies this paper, illustrating the points made by the speaker. Questions relating to the processing, compounding and application of Butyl Rubber will be answered by Dr. Frolich at the end of the paper. Members of the Northeastern Division of the Society have been invited to attend both the meeting and dinner. Accordingly, because a large attendance is anticipated, it is urged that reservations be made early.

MARSHALL AND DAVIS HEAD RHODE ISLAND RUBBER CLUB

John E. Marshall, Jr., of the Collyer Insulated Wire Co., and Arthur J. Davis, of the Goodyear Footwear Corp., were elected president and secretary-treasurer, respectively, of the Rhode Island Rubber Club, at a meeting held at the Metacomet Golf Club, in East Providence, on September 27, 1940. Approximately 120 members and guests attended the meeting, with about 50 participating in the golf tournament held earlier in the afternoon.

In addition to the two officers named, the following were elected to the Executive Committee of the club: L. K. Morrow (Anaconda Wire & Cable), F. P. Jecusco (U. S. Rubber), S. L. Lake (Respro), L. K. Youse (Firestone), T. F. Springer (Davol Rubber), D. Rhee (Carr Mfg.), and J. H. Christopher (Titanium Pigment). D. C. Scott, Jr., the retiring president, automatically becomes a member of the committee. The Nominating Committee was headed by F. Roy Carey, New England representative of RUBBER AGE, and included Charles Berlow (American Wringer), D. C. Scott, Sr. (Henry L. Scott Co.), Ralph Huber, and W. F. Kelsey (Easthampton Rubber Thread).

Speakers for the evening were W. L. Finger, assistant to the president of the Rubber Manufacturers Association and a member of the Advisory Commission to the Council of National Defense, and Clifton N. Lovenberg, executive secretary of the Rhode Island Industrial Commission. Both speakers delivered off-the-record addresses. Mr. Finger discussed the role of rubber in the nation's defense and Mr. Lovenberg confined his talk to the part being played in the same defense by the State of Rhode Island.

Golf Tournament Winners

Winners of the various events in the golf tournament were: *Low Net,* C. P. Mullen and L. G. Whittemore; *Second Net,* C. P. Seavins and Len Yates; *Low Gross,* L. Colligen, Bill Bruckhauser and W. Morrisey; *Kicker's Handicap,* F. F. Salomon. Prizes were distributed to all winners in the tournament, as well as to holders of lucky number tickets. The prizes were made possible by contributions from the following firms:

Agar Manufacturing, American Zinc Sales, Arnold Hoffman, Barrett, Binney & Smith, Godfrey L. Cabot, Cleveland Liner, Continental Carbon, Curran & Barry, DuPont, Eggleston, Farrel-Birmingham, Federal Products, Gair, Industrial Paper, Ernest Jacoby, Kleistone Rubber, Meyer & Brown, Monsanto Chemical, H. Muehlstein, National Vulcanized Fibre, N. J. Zinc, Pequanoc Rubber, Phillips Bros., Respro, Henry L. Scott, A. Schulman, Wm. B. Shaw, Taylor Instrument, E. T. Trotter, R. T. Vanderbilt, Vansul, L. G. Whittemore, Chas. T. Wilson, and Wishnick-Tumpeer.

LOS ANGELES NEWS

Charles Lamb, vice-president and general manager of the West American Rubber Company, Inc., 410 North Avenue 19, spent three weeks of last month in the east, the greater portion of the time in New York City.

Mr. and Mrs. J. F. Bennett and daughter, enroute to Australia from Akron, stopped over a few days in Los Angeles this month. Mr. Bennett is secretary and treasurer of Goodyear-Australia. The family sailed for Australia September 18.

Frank A. Steele, general manager of the Goodyear plant in Los Angeles, spent a portion of September attending a meeting of plant superintendents in Akron. He took occasion to visit the old home farm on which he spent his boyhood.

The Golden State Rubber Mills, Inc., 651 East 61st Street, Los Angeles, has completed re-arrangement of machinery and installation of new mills to take care of constantly increasing production. One specialty item, a Scotch purse, has increased in popularity steadily since being introduced and now is being shipped to all parts of the country.

Joe Herbert, general manager of the local Goodrich plant, spent some time in the Huntington Memorial Hospital in Pasadena during the past month where he underwent a slight operation.

J. R. Morath, technical representative of Naugatuck Chemical, spent several days in Los Angeles during the latter part of September and early part of October. Mr. Morath lives in Chicago.

Ed Royal, local manager for H. M. Royal, Inc., reports business good in practically every line he represents.

Latex Seamless Products Co., headed by Carl E. Stentz, had so much business on hand during the last month that it was necessary to erect a tent beside the present building to shelter the acid tanks on hand for treatment. August was the biggest month in the history of the company, Mr. Stentz reports.

Bill Reeder, purchasing agent for the U. S. Rubber Company, has returned from an extended vacation trip which took him to many points in the East. He was accompanied by his family and drove a new car back from Detroit.

Bowling and other sports activities are on in earnest at the Goodrich plant. Eight bowling teams are now active beginning their series of plays September 20. The Rod and Gun Club met October 3 to plan its schedule.

Sherm G. Burgess, employment manager and member of the efficiency department at Goodyear, has been transferred to Akron where he takes a position in the labor department.

Word has been received that Bill Northrup, formerly of Los Angeles, has gone to Trinidad with his family where he will spend three years in the interest of Goodyear.

F. S. Carpenter, of the U. S. Rubber Company, who spent some time in South America where the company had planned to build a plant, is spending part of his time now in Los Angeles and part of it in New York.

T. G. Graham, vice-president in charge of plant operations, Goodrich, Akron, was in Los Angeles for several days in September on general business connected with the local plant.

Circle Workers Return to Plant

Employees of the Circle Wire & Cable Co., Maspeth, L. I., N. Y., returned to work on September 23 after a strike of nearly two months. Settlement followed arbitration efforts by Mayor LaGuardia of New York. Retention of the closed shop and of seniority rights, the re-employment of all strikers, and a guaranty that the plant would not be moved beyond the New York City five-cent fare zone during the one-year period of the agreement, was granted the union, according to Harry Van Arsdale, business manager of Local 3 of the International Brotherhood of Electrical Workers. Workers at the Triangle Conduit & Cable Co. and the Bishop Wire & Cable Co., however, are still on strike at this writing.

New Courses at M. I. T.

The Massachusetts Institute of Technology will give several courses of interest to students of rubber during the present semester. Dr. Ernst A. Hauser will give two courses, one on the general chemistry of rubber and the other on advanced colloidal chemistry. Mr. Morris Omansky will present a new course on rubber products of special interest to non-technical students. This latter course starts on November 12 and will consist of 16 lectures in all. In addition, Professors Lewis and Reed will again give their courses on plastics.

LOS ANGELES RUBBER GROUP HAS FIRST MEETING OF SEASON

The first monthly supper meeting of the new season of the Los Angeles Group, Rubber Division, A.C.S., was held in the Rainbow Room of the Hotel Mayfair in Los Angeles, on Tuesday, October 1. Approximately 90 members and guests attended the meeting. Ten new members were voted in.

The main speaker of the evening was Theodore Valle, who has spent many years trading with the natives in Ethiopia and other parts of Africa. He gave a resume of conditions in Ethiopia as he envisions them in addition to reciting a number of personal incidents.

Hugh A. Matier, of the public relations department of the Union Oil Company of California, showed a number of color and sound pictures of the Arizona desert and a sea film known as "Neptune's Mysteries." Mr. Matier is a Fellow Royal in the Anthropological Institute and a Founder Member of the Pacific Geographic Society. He is also a Patron of the Smithsonian Institution. He presented interesting theories of early American civilizations.

The special prize was presented by William Holmes, through the courtesy of the Dill Manufacturing Company. This prize, a beautiful portable radio, was won by Fred Hiller, member of a new rubber brokerage firm in Los Angeles. The door prize, a portable cigar lighter, presented by Bert Dougherty through the courtesy of the B. E. Dougherty Company, was won by M. B. Riggs of Goodyear. Table favors were "Pick-A-Bands," donated by Goodrich.

Akron Group Meets November 8

The next meeting of the Akron Group, Rubber Division, A.C.S., will be held at the Akron City Club on Friday, November 8. Dinner will be served at 7:00 P.M. After dinner, Warren H. Chase, commercial training supervisor for the Ohio Bell Telephone Co., at Cleveland, Ohio, will discuss recent developments in the transmission of voice. He will have special amplifying equipment which will enable all those present to hear as well as see each demonstration. Reservations should be made promptly with T. L. Stevens, 2510 First Central Tower, Akron, secretary-treasurer of the group.

Buffalo Meets October 17

The first regular meeting of the Buffalo Group, Rubber Division, A.C.S., will be held at the Hotel Lenox in Buffalo on Thursday, October 17, at 7:00 P.M. F. M. Andrews, sales manager of the recently-organized Hydrocarbon Chemical & Rubber Co., Akron, producers of "Hycar," will be the principal speaker. He will explain the properties, methods of manufacture and general uses of the new material, according to the announcement of the meeting.

NAMES IN THE NEWS

W. Gleed "Bill" Coe, production manager for The Rubber Age for the past three years, has left that position to join the product control department of the Fisk Tire Division, U. S. Rubber Co., at Chicopee Falls, Mass. He has been succeeded by Martin Clifford who was associated for several years with the Howell Publishing Co., publishers of trade journals.

Glenn E. Falkner, factory manager, Faultless Rubber Co., has been appointed a member of the Ashland County (Ohio) Draft Board. He served overseas for 13 months in the World War and has since been an active member of the American Legion.

Ralph L. Dickey, who joined U. S. Rubber as manager of its new products department in 1928 and remained with that company until 1937, has just been elected president and general manager of the Kelley Island Lime & Transport Co., Cleveland. While with U. S. Rubber he helped introduce an economically practical rubber battery separator.

John Delmar Underhill, vice-president of the Okonite Co., the Okonite-Callender Cable Co., and the Hazard Insulated Wire Works, Passaic, N. J., was tendered a dinner and reception on September 16 by his fellow employees in celebration of his completion of 50 years of service with the company.

R. P. Dinsmore, director of development and research, Goodyear Tire & Rubber Co., Akron, addressed the Mid-Western Conference of the National Chemurgic Council in Cleveland on September 17. He labeled as "dangerous" and "unduly optimistic" the view that production of synthetic rubber has solved the problem of America's rubber supply.

J. E. Brandien, formerly associated with U. S. Rubber at the Naugatuck, Conn., plant, has joined the Surety Rubber Co., Carrollton, Ohio, where he will install and operate a latex department.

Dr. Leo Nast has resigned as vice-president of the Universal Plastics Corp., New Brunswick, N. J., manufacturers of plastic products and hard rubber trays. E. Sessler has been made general manager of the organization.

Harvey S. Firestone, Jr., vice-president of the Firestone Tire & Rubber Co., delivered the principal address at the Luncheon Session of the Conference on Distribution, held in Boston, Mass., on October 7. He discussed "New Processes, New Products and the Consumer."

Kenneth S. Wyatt, formerly technical director of the Enfield Cable Works, Ltd., London, England, has joined the staff of the Habirshaw Wire & Cable Division of the Phelps Dodge Corporation, New York City.

J. J. Newman, vice-president in charge of tire sales for the B. F. Goodrich Co., Akron, was the principal speaker at a meeting of the American Life Convention, comprising representatives of leading life insurance companies, held on October 10 at the Edgewater Beach Hotel in Chicago. He discussed synthetic rubber.

George R. Hill, formerly associated with the rubber department of the research laboratories of R. T. Vanderbilt Co. at East Norwalk, Conn., has joined the staff of the Lloyd Manufacturing Co., Apponaug, R. I., manufacturers of rubber-coated fabrics.

Carl Schell, formerly with the Thermoid Co., Trenton, has been appointed factory engineer for the Jos. Stokes Rubber Co., Trenton, which is reported operating to capacity.

Homer O. Eckert, of Akron, has been named manager of the export office of the B. F. Goodrich Co., with headquarters in New York City.

Chicago Group Meets October 18

Dr. Arthur W. Campbell of the Commercial Solvents Co., Terre Haute, Indiana, will discuss the "Properties of Various Types of Carbon Blacks" at the next meeting of the Chicago Group, Rubber Division, A.C.S., which will be held on Friday, October 18, at the Sherman Hotel in Chicago. The technical session will start promptly at 6:45 P.M. in the Crystal Room of the Sherman, and dinner will be served in the hotel's College Inn after this session. This arrangement will permit members to remain in the College Inn, which always has an interesting show, for as long as they wish.

New Synthetic Named "Hycar"

The synthetic rubber merchandised by the Hydrocarbon Chemical & Rubber Co., Akron, will be sold under the name of "Hycar," it has been announced by Ross W. Thomas, president. The company, recently organized by the B. F. Goodrich and Phillips Petroleum companies for the manufacture and sale of synthetic rubber, will shortly issue bulletins and technical data on its products.

Calbeck Joins American Zinc Sales

A. C. Eide, Manager of the Pigment Division, American Zinc Sales Company, Columbus, Ohio, announces the appointment of John H. Calbeck as Director of Research of the Pigment Division, succeeding Harlan A. Depew, who has resigned to accept a position with the Sherwin-Williams Company at Gloucester City, New Jersey.

Mr. Calbeck is a graduate of Southwestern College, Winfield, Kansas, 1913. He obtained his master's degree at the University of Kansas in 1915. He is no stranger to the pigment industry, having been actively identified with it since 1919 following service in France as a first lieutenant in chemical warfare service. Until 1927 he was Director of Research for the Eagle Picher Lead Company, and later engaged in private research and consulting work at Joplin, Missouri.

Since 1932 he has been identified with the American Zinc Sales Company as a consultant on special pigment development. Except for the period from 1934 to 1937 when he was in Columbus, Mr. Calbeck has been residing in Joplin, Missouri. In his new capacity he will make his headquarters at Columbus, Ohio.

Mr. Calbeck will be remembered by many technologists in the paint and rubber industries, who will welcome his return in a position that will permit renewing acquaintances and maintaining active contact in the future. In his previous work. Mr. Calbeck will be remembered as the author of many comprehensive papers and articles on zinc and lead pigments, lithopone, and work of general interest to the paint and rubber industries.

Mr. Calbeck has also developed patents which have now been placed in general practice in the pigment industries. His long experience in the production of lead and zinc pigments makes him well fitted in his new capacity to contribute to the American Zinc Sales Company's technical activities, which have become so well known to the trade.

OBITUARIES

W. F. V. Cox

Walter Felix Virgil Cox, general secretary of the Institution of the Rubber Industry, died at his home in Bromley, Kent, England, from heart failure on August 19 at the age of 43. Mr. Cox's entire business life had been spent in the service of the I. R. I., since he became secretary of what was then known as the Rubber Club of Great Britain in 1922 and which at the beginning of 1923 became the present Institution.

The younger son of the late Walter Frederick Cox, who was associated with the well-known firm of Wm. Warne & Co., Ltd., for almost 47 years, Mr. Cox was largely credited with the formation of rubber schools at the Newton Heath Technical School, Manchester, and the Stow College School of Engineering, Glasgow. He was also instrumental in organizing sections of the I. R. I. in Manchester, Birmingham, Leicester, West of England, Scotland and Preston, all of which are now functioning satisfactorily.

About 15 years ago, in conjunction with Mr. Basil Joy, Mr. Cox organized the United Secretaries Club, composed of secretaries of various organizations connected with the automotive industry. In 1927 he organized a successful two-day Rubberware Exhibition at Central Hall, Westminster. In 1929 he paid a lengthy visit to the United States and formed many lasting friendships. He is also credited with the organization of the Rubber Technology Conference which was held in London in May, 1938, and which attracted rubber technologists from all over the world.

Mr. Cox's main aim for the I. R. I. was the possession of a Royal Charter of Incorporation, and although the first application for this charter was refused he entertained high hopes of securing it in the near future. A Past Master of the Industries Lodge and a member of the Scientific Secretaries Society, Mr. Cox became an Air Raid Warden at the outbreak of the present war, but later transferred to the Observer Corps. He was a keen golfer.

Funeral services were held at the Streatham Park Crematorium, London, on August 22. A widow and two children survive.

Edward J. Coughlin

Edward J. Coughlin, a vice-president, director and member of the executive committee of the United States Rubber Co., died at his home, 146 Central Park West, in New York City, on October 6. Mr. Coughlin, who was 68 years old, would have completed forty-nine years of association as an employee and officer of the company next January. He had risen from a shipping clerk in the Passaic plant, which he entered in January, 1892, and was active in the management of the company until a few weeks before his death.

Born in Brooklyn, New York, on August 13, 1872, Mr. Coughlin attended grammar school in that borough until the age of 11, when he left school to take a job in a dry goods establishment. He continued his education at night schools. In 1895, three years after he entered the employ of the rubber company as a shipping clerk, he was appointed assistant superintendent of the factory. He was less than 23 years old at the time, and the youth of the appointee to such a relatively important industrial management post was commented upon by the newspapers. In 1901 he became superintendent and in 1903 factory manager.

In January, 1916, he came to the general offices of United States Rubber Company in New York as general factory manager of the company's mechanical goods division. Four years later he was named 2nd vice-president, and in 1929 was elected a director and member of the executive committee of the company's board of directors. He had been chairman of the company's board of benefits and awards during the past six years; chairman of its purchasing committee; chairman of its insurance committee; and until his retirement from the post last March had been vice-president of United States Tire Dealers Corporation—a nation-wide organization of tire merchants with more than 33,000 members. He was a member of the Lotos Club, of New York, and the Arcola Country Club, of New Jersey.

Funeral services were held at the Universal Funeral Chapel in New York City on October 8. Interment was in Cedar Lawn Cemetery, Paterson, N. J. He leaves a widow and three sons.

John H. Diehl

John H. Diehl, associated with the rubber industry for almost two decades, died on September 13 at his home in Miami, Florida, where he had lived since 1935. He was 68 years of age. Joining the sales division of the Goodrich organization before the turn of the century, Mr. Diehl later joined the old Portage Rubber Co. as sales manager and in 1922 became general sales manager for the Mason Tire & Rubber Co., later becoming a vice-president and a director. He resigned the latter position in 1928. Funeral services were held in Barberton, Ohio, on September 17, with interment in Glendale Cemetery. He leaves a widow and three sons.

Harry M. Flint

Harry M. Flint, development engineer on hose and belts for the Firestone Tire & Rubber Co., Akron, and formerly chief chemist of the Gates Rubber Co., Denver, Colorado, died of a heart attack at his home in Indianapolis on August 14. He was 47 years of age. Born in Garden Plains, Kansas, in 1893, Mr. Flint was graduated from the University of Colorado in 1918, receiving a degree in Chemical Engineering. He received a second degree from the same university in 1930. Shortly after being graduated he joined Gates Rubber in the development department and was made chief chemist five years later. He occupied the latter post until 1938 when he left the company to join Crown Products Co., Ralston, Nebraska, remaining there for about one year. Shortly thereafter he joined Firestone. Mr. Flint was a long-time member of the American Chemical Society. He was also a member of Alpha Chi Sigma.

Barton L. Jones

Barton L. Jones, associated with the development department of the Goodyear Tire & Rubber Company for the past 20 years, died at Peoples Hospital, Akron, on October 7, at the age of 48. During the World War Mr. Jones spent 18 months overseas. He was a prominent veteran and a past commander of American Legion Post 209. He was also a Mason, member of the Eagles and Odd Fellows, and an active member of the Grace Methodist Church where he served on the board of trustees. In the last municipal election in Akron he unsuccessfully sought the Democratic nomination for Tenth Ward councilman. Funeral services were held on October 10, with interment in Memorial Park Cemetery. A widow survives.

Corduroy Rubber Co.

For 1939: Net income of $233,233, equal to $3.76 a share on 28,400 common shares after preferred dividend requirements, which compares with $195,025, or $2.83 a share on 28,469 common shares, in the preceding year.

Faultless Rubber Co.

Year Ended June 30: Net profit of $137,621, equal to $2.10 a share on 65,450 shares of no-par capital stock, which compares with $70,324, or $1.07 a share, in the year ended June 30, 1939.

L. H. Gilmer Company

First Half: Net income of $53,595, or 65 cents a share on 82,824 shares, which compares with $46,891, or 57 cents a share, in the corresponding period of the previous year. Net sales for the period amounted to $713,655 against $634,580 last year.

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NEW EQUIPMENT

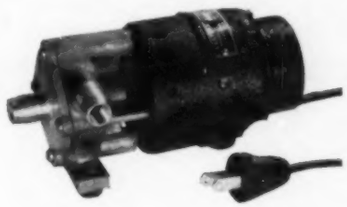
Press for Curing Sponge or Blown Goods

Illustrated herewith is an open view of a new design press for curing sponge or blown goods, such as inflated toys or small size pneumatic tires, either for industrial use or for small wheel toys, recently developed and introduced by the McNeil Machine & Engineering Co., 96 East Crosier St., Akron, Ohio. The press is electrically operated and fully automatic. It is equipped with steam platens approximately 40 x 40 inches square. When curing small pneumatic tires, as many as 9 small individual molds can be mounted in the press at one time, all of which can be inflated and deflated automatically. The press can be equipped with automatic stripping to simplify the removal of small non-skid or ribbed design tires. An approximate 100,000-pound squeeze is exerted against the molds. The new press is said to be very fast in operation, closing in about five seconds. Due to this speed, it has been equipped with a safety bar which goes around the front edge of the press and which travels up and down with the upper platen. Should anything get in the way of the upper half during its closing stroke, it stops instantly upon contact with the safety bar. This new safety feature, as well as the special design of timer, is covered by pending patents.

Eastern Midget Pumps

A new line of Midget Pumps was recently introduced by the Eastern Engineering Co., of New Haven, Conn. The entire line is said to be unique in the field of pump equipment. Although designed for applications where space and portability are factors, the pumps will handle problems which normally would require large and bulky equipment. The entire line comprises several different models and specifications. There are 8 models in all. Models A, B and E are of the open impeller centrifugal types, for high pressures and volumes. Models C and D are open impeller centrifugal pumps, powered by non-sparking induction

type motors, designed for moderate pressures and capacities, for continuous duty over long periods of time, and for use in the presence of fire and explosion hazards. Model HT is centrifugal, designed for very hot liquids at high pressures and in large volume. Model



UT is a positive displacement rotary type, designed for high pressures and moderate volumes. Sump pumps are specially adapted open impeller centrifugals, designed for medium hour performance. These models are available with automatic float control. With the exception of Models C and D, all Eastern Midget Pumps are powered with a Universal motor. Model A is illustrated.

Taylor Process Timing Mechanism

Exact duration of batch processing, as well as precise temperature or pressure control on applications such as vulcanizers, hosiery dye machines and canners' retorts, are said to be assured by the use of the new process timing mechanism for Taylor Fulscope Recording Controllers just introduced by the Taylor Instrument Companies, Rochester, N. Y. The new mechanism is said to be easy to operate. The timing process is manually started by adjusting the instrument for the desired time period. With this new feature, the timing automatically starts, not immediately, but when the apparatus reaches the set point of the controller. At the end of the desired period, the

mechanism automatically terminates the process. To facilitate the timing of successive batches of the same duration, a "stop" is furnished on the timing mechanism dial. With this "stop" set at the desired timing period, the pointer can be quickly spun to the "stop" and the starting operation speeded up.

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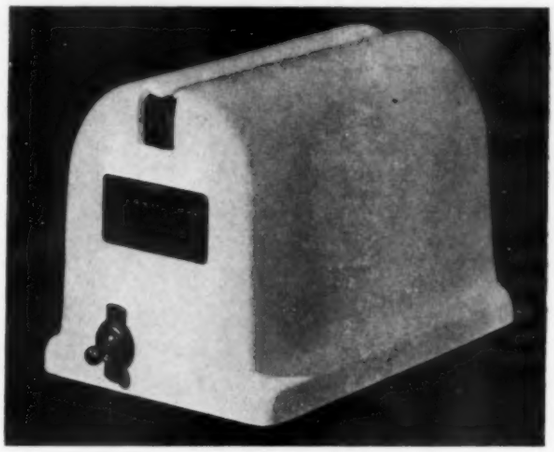
Sharpmaster Electric Knife Sharpener

An electric knife sharpener which has found application in a number of rubber factories is the Sharpmaster, a product of the E. E. Krumeich Co., Akron, Ohio. Wheels of the device are made of aluminum



oxide so spaced and interlocked as to produce the keenest possible cutting edge through a new spinning "V" principle. This principle permits the sharpening wheels to come in contact with only the extreme edge of the knife. The sides of highly polished blades, therefore, are in no way defaced. Four inches wide, 6 inches deep and 4 inches high, weighing 5 pounds, the Sharpmaster is so designed as to completely enclose all moving parts, including the sharpening wheels, so that no injury can come to the user of the machine. All sizes of knives, regardless of the length or width of the blade, can be handled by the machine.

BRIEFS . . .

The complete redesign of its line of **6-inch Medium Capacity Vertical Turbine Pumps** is announced by the Pomona Pump Co., Pomona, Calif. As a result of improved engineering practice, particularly in newly designed impellers and seats, the new models are said to afford higher efficiency and better performance.

•

Flexibility of installation, convenience of operation, and ease of adjustment are three features claimed by the Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia, for its completely redesigned **Industrial Furnace Pressure Controller.** Adjustments are said to be facilitated by two sets of convenient weights, one set adjusting the zero setting of the instrument's mechanical balance, and the second adjusting its sensitivity.

•

The **Comparator-Densitometer** recently introduced by the Harry W. Dietert Co., 9330 Roselawn Ave., Detroit, is said to furnish a unit for accurately and speedily projecting a spectogram on a viewing screen and enabling positive spectral lines identification of up to 70 elements. The density of any spectral line may be easily measured by pressing a control button which starts automatic motor scanning of the line.

REVIEWS

BOOKS

Our Future in Asia. By Robert Aura Smith. Published by the Viking Press, 18 East 48th St., New York City. 5½x8⅜ in. 306 pp. $3.00.

The author of this book, a correspondent of the *New York Times*, not only is familiar with the problems of the Far East, but he seems to be equally as familiar with the problems of rubber supply. He sums up the latter situation neatly, in the following few lines: "Our luxury in living is primarily the luxury of rubber. . . . It is no wonder that when we look to life-lines in trade our first look should be at our rubber supply. . . . That rubber life-line, of course, leads straight to the South China Sea." He warns the layman that neither synthetic substitutes or rebirth of rubber cultivation in South America is an immediate answer to the danger threatening from the Far East insofar as crude rubber supplies is concerned.

Although rubber occupies the author's attention throughout this book, he, of course, considers other economic problems as well. Basically, he attempts to answer such questions as these: Must we fight Japan? Is the Far East essential to our welfare? Will we defend our "life-line" to it? Is it our next battleground?—and answers them with the experience and knowledge absorbed from years of contact with Asiatics. To a more complete understanding of how the Orient affects American lives, American defenses and American economy, this book is recommended.

•

Smoke Screen. By Samuel B. Pettengill. Available from America's Future, Inc., 205 East 42nd St., New York City. 5¼ x 8 in. 126 pp. $1.00. (Special prices in quantity.)

Written by a former member of Congress (from Indiana), this book is a direct attack on National Socialism. Using numerous proofs to indicate that this country is moving toward National Socialism, Mr. Pettengill piles up a powerful argument as to why we should from now on move away from it. He takes the attitude, based on eight years of observation in Congress, that the American people will not freely and deliberately elect to follow the path of National Socialism, but that the decision is being made for them behind the "smoke-screen" of an unguaranteed political promise of the more abundant life. Hence the title of the book. Basically, the book attempts to answer the single important question as to whether the general welfare we all seek can be more certainly attained under free enterprise or collectivism.

•

Little Bits About Big Men. By B. C. Forbes. Published by the B. C. Forbes Publishing Co., 120 Fifth Ave., New York City. 5x7½ in. 218 pp. $2.50.

For many years B. C. Forbes, reporter, editor and publisher, has met, interviewed and hob-nobbed with outstanding figures in the world of finance, industry, commerce, politics, government and public life. It was inevitable that he gather together countless anecdotes, squibs and philosophic nuggets concerning these personalities. These *bon mots* are presented in this book in an off-the-record manner, every one of them secured "through personal elbow-rubbing." The accent in the book is on men in business, financial and public life. Anecdotes on several members of the rubber industry, including John Lyon Collyer, president of Goodrich, and William O'Neil, president of General Tire, are included.

(*Reviews are continued on the next page*)

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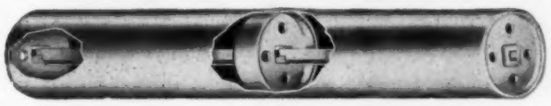

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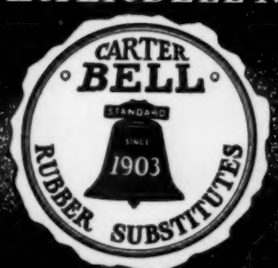

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BOOKLETS, CATALOGS, Etc.

Five Years: The Story of the United Rubber Workers of America. Published by United Rubber Workers of America, United Building, Akron, Ohio. 8¾ x 11¾ in. 56 pp. 25c per copy.

This book traces chronologically the progress of the U.R.W.A. from the time it formally became an affiliate of the American Federation of Labor in 1935 through its secession from that body and affiliation with the Committee for Industrial Organization to the present. Issued in commemoration of the fifth anniversary of the chartering of the union, the book also sketches the discovery of rubber and the growth of the industry as a background to the formation and functioning of the present union. It is replete with photographs, particularly of those individuals who directly or indirectly contributed to the expansion of the U.R.W.A.'s activities.

•

Directory of New England Manufacturers: 1941. Published by George D. Hall, Inc., 30 Kilby St., Boston, Mass. 7½ x 10½ in. 764 pp. $20.00.

The latest edition of this "library of information" on the manufacturing industries of New England has been revised and brought completely up-to-date. Some idea as to the work involved is indicated by the fact that there are more than 17,000 changes in vital information since the previous edition. Like the earlier issues, the current edition lists all manufacturers in the New England area, has a classified section of products and their producers, tells the size and personnel of the various companies, and locates sources of supply geographically, as well as by product. It is an accurate guide to the manufacturing resources of New England of value to both buyer and seller alike.

•

Santocure—An Accelerator for Rubber Vulcanization. Rubber Service Department, Monsanto Chemical Co., Akron, Ohio. 9 x 11¾ in. 52 pp.

Advantages offered by Santocure, a reaction product of cyclohexylamine and mercaptobenzothiazole, in rubber compounds of various kinds, and when used in conjunction with other accelerators, are stressed in this new booklet. There is a one-page description of Santocure, following which the balance of the booklet is given over to formulas incorporating this accelerator and the results of physical tests on each compound. The data presented will give the compounder some insight on the general behavior of Santocure.

•

Properties and Uses of Gastex and Pelletex. General Atlas Carbon Co., 60 Wall St., New York City. 6 x 9 in. 24 pp.

This booklet sketches briefly the development of Gastex and Pelletex, the two blacks featured by General Atlas, both of which are produced by a process of electrical precipitation instead of the conventional channel process. In addition, it describes some of the peculiar properties of these materials and suggests a few applications in the rubber industry to which their properties lend themselves. Among products discussed are tires, mountings, mechanical goods, molded goods, footwear and wire jackets. Attractively printed, the booklet is well illustrated.

•

Rubber Black Testing Procedures. Godfrey L. Cabot, Inc., 77 Franklin St., Boston, Mass. 8½ x 11 in. 16 pp.

Essentials of the group of tests used by Cabot to evaluate blacks for use in rubber are presented in this manual. This group, capable of discriminating between minute differences in the properties of carbon black, includes tests on DPG adsorption, volatile matter and moisture, flexing, plasticity, rebound and indentation, stress-strain, abrasion, aging, etc. Illustrations of the various instruments used, accompanied by brief descriptions of both the instruments and the process, are given. Cabot's standard recipe and mill room procedure for grading carbon black is also given.

MARKETS

Rubber – Crude, Reclaimed and Scrap – Cotton – Ducks – Tire Fabrics – Sheetings

NEW YORK, OCTOBER 10, 1940

Crude Rubber

CRUDE rubber prices for spot on the Commodity Exchange were steadied at a 19.25 figure in mid-September, largely due to the influence of the government as a buying factor in the market in connection with its agreement with the International Rubber Regulation Committee to pile up reserve stocks of rubber in this country. The agreement provides that the government purchase rubber on the open market when the price rests between definite margins. However, the news that Japan had joined the Axis powers caused the price to jump to 19.62 on September 27. Continued fears with respect to the situation in the Far East has resulted in still further price advances, today's quotation of 20.05 being the high for the period. Low was 19.19 on September 11. Rubber futures prices have also jumped sharply in the past few days and the entire market is awaiting developments which may follow the opening, or the attempted opening, of the Burma Road by Great Britain later this month. Quotations in the outside market, Exchange London and Singapore, follow:

As of October 10

Plantations—

Ribbed Smoked Sheets—			
No. 1 Spot	—	@	.20⅛
November	—	@	.20¼
January-March	—	@	.20⅛
No. 2	—	@	.19⅞
No. 3	—	@	.19¾
No. 4	—	@	.19⅝
Thin Latex Crepe	—	@	.20⅛
Thick Latex Crepe	—	@	.20¼
Brown Crepe, No. 1	—	@	.18¾
Brown Crepe, No. 2	—	@	.18½
Amber Crepe, No. 2	—	@	.18¾
Amber Crepe, No. 3	—	@	.18½
Brown Crepe, Rolled	—	@	.15

Latex—

Normal, per lb., carload lots	—	@	.24¾

Paras—

Up-River, fine	—	@	.16⅞
Acre Bolivian, fine	—	@	.17

Balata—

Brazilian block	—	@	.14

LONDON MARKET

Standard Smoked Sheets—Buyers—October 10

December	11 1/32	@	11 1/32d
January-March	—	@	11 7/32d

SINGAPORE MARKET

Standard Smoked Sheets—Sellers—October 10

October	—	@	10 5/32d
January-March	—	@	9 25/32d

Scrap Rubber

Dealers report business as good in the scrap rubber field and anticipate still greater demand in the near future. Prices on boot and shoe grades have jumped sharply since our last report. A slight increase in the price of clean solid truck tire grades has also been put into effect. Other quotations remain firm. Current quotations follow:

(Prices to Consumers)

Auto tire peelings	ton 22.00	@	23.00
Mixed auto	ton 14.00	@	15.00
Beadless tires	ton 18.00	@	19.00
Clean solid truck tires	ton 31.00	@	32.00
Boots and shoes	ton 24.00	@	25.00
Arctics, untrimmed	ton 18.00	@	19.00
Inner tubes, No. 1	lb. .10	@	.11
Inner tubes, No. 2	lb. .04¼	@	.05
Inner tubes, Red	lb. .04½	@	.04¾

Reclaimed Rubber

Demand for reclaim increased slightly last month. Still greater demand is anticipated for the immediate future, with production getting under way on the new automobile models, the insulated wire factories operating at near capacity, and the rubber trade in general enjoying improved business conditions. There has been no change in the price structure since our last report. Current quotations follow:

Shoe

Unwashed	lb. .06½	@	.06¾
Washed	lb. .10	@	.10¼

Tube

No. 2 (Compounded)	lb. .09	@	.10
Red Tube	lb. .09	@	.09¼

Tires

Black (acid process)	lb. .07	@	.07¼
Black, selected tires	lb. .06	@	.06¾
Dark Gray	lb. .09¼	@	.10
White	lb. .12½	@	.14
Truck, Heavy Gravity	lb. .05½	@	.06
Truck, Light Gravity	lb. .07	@	.07½

Miscellaneous

Mechanical blends	lb. .04¼	@	.05

Tire Fabrics

(Prices Net at the Mill)

Peeler, carded, 23/5/3	lb. .29½	@	.29¾
Peeler, carded, 23/4/3	lb. .30½	@	.30¾
Peeler, carded, 15/3/3	lb. .27½	@	.27¾
Peeler, carded, 15/4/2	lb. .27½	@	.27¾
Peeler, carded, 13/3/3	lb. .26½	@	.26¾

CHAFERS

Carded, American, 1 1/16"	lb. .29½	@	.30
Carded, American, 1"	lb. .20¼	@	.28½

Cotton

Cotton prices swung in a narrow 25 point range since our last report, low for the period being 9.59 and high 9.84. In view of unsettled conditions abroad and the danger to world peace envisioned by the new triple axis agreement—Germany-Italy-Japan—the steadiness of the price structure is remarkable. Cotton production in the United States from the 1940 crop was estimated at 11,925,000 bales by independent sources early in October, but this figure was raised to 12,741,000 bales later in the month by the Crop Reporting Board of the Agricultural Marketing Service. In either case, release of the estimate figures did not appreciably affect the market. For the most part, the market was steadied by mill price fixing, but a considerable increase in the volume of hedge selling, coupled with more liberal liquidation on the part of recent longs, carried prices downward today (October 10). An early rally is anticipated. Quotations for middling uplands on the Exchange follow:

	Sept. 9	October 10		
	Close	High	Low	Close
December	9.25	9.54	9.49	9.49
March	9.07	9.50	9.41	9.44
May	...	9.40	9.31	9.31

Sheetings

48x40	36 in.	5.50	lb.	— @	.04¼
40x40	36 in.	6.15	lb.	— @	.03⅞
40x36	36 in.	6.50	lb.	— @	.03¾
48x48	40 in.	2.50	lb.	— @	.08
48x48	40 in.	2.85	lb.	— @	.07⅛
56x60	40 in.	3.60	lb.	— @	.07
48x44	40 in.	3.75	lb.	— @	.05⅞

Ducks

Enameling (single filling)	lb. .24	@	.25
Belting and Hose	lb. .26¼	@	—
Single filling, A grade	lb. .12	@	.12½
Double filling	lb. .13	@	.13½

Closing Rubber Prices on New York Commodity Exchange, Inc.

No. 1 Standard Contract of 10 Tons

FROM SEPTEMBER 10 TO OCTOBER 10

Date	Spot	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Sales
Sept. 10	19.25	19.06	19.06	19.06	19.06	18.95	18.90	18.85	18.80	18.75	——	46
11	19.19	19.00	19.00	19.00	18.97	18.86	18.83	18.80	18.75	18.70	——	132
12	19.19	18.95	18.95	18.94	18.92	18.89	18.85	18.82	18.77	18.72	——	81
13	19.19	18.97	18.97	18.95	18.95	18.89	18.83	18.78	18.75	18.72	——	60
14	19.19	19.00	18.98	18.96	18.95	18.89	18.83	18.78	18.75	18.72	——	11
15	——	——	——	——	——	——	——	——	——	——	——	——
16	19.25	19.05	19.04	19.03	19.02	18.98	18.94	18.90	18.87	18.84	——	26
17	19.25	19.05	19.05	19.04	19.03	18.97	18.91	18.85	18.82	18.79	——	97
18	19.25	19.05	19.05	19.05	19.00	18.94	18.87	18.80	18.75	18.70	——	122
19	19.25	19.08	19.05	19.05	18.99	18.91	18.83	18.75	18.70	18.65	——	110
20	19.25	19.08	19.08	19.08	19.05	18.99	18.92	18.86	18.81	18.76	——	31
21	19.25	19.01	19.00	19.00	18.98	18.90	18.85	18.80	18.75	18.70	——	1
22	——	——	——	——	——	——	——	——	——	——	——	——
23	19.25	19.05	19.05	19.05	19.04	18.91	18.88	18.85	18.81	18.78	——	34
24	19.25	19.13	19.12	19.11	19.11	19.06	19.01	18.96	18.92	18.88	——	77
25	19.31	19.21	19.21	19.19	19.18	19.10	19.03	18.96	18.90	18.85	——	58
26	19.31	——	19.24	19.22	19.21	19.15	19.10	19.05	19.00	18.95	——	52
27	19.62	——	19.60	19.55	19.50	19.41	19.33	19.25	19.20	19.15	——	169
28	19.62	——	19.55	19.52	19.49	19.43	19.37	19.32	19.26	19.20	——	30
29	——	——	——	——	——	——	——	——	——	——	——	——
30	19.62	——	19.55	19.52	19.50	19.44	19.38	19.32	19.25	19.20	——	42
Oct. 1	19.62	——	19.60	19.58	19.56	19.50	19.44	19.39	19.33	19.28	——	29
2	19.62	——	19.57	19.54	19.52	19.47	19.42	19.37	19.33	19.30	——	38
3	19.62	——	19.60	19.57	19.55	19.50	19.45	19.40	19.35	19.30	——	28
4	19.62	——	19.63	19.60	19.58	19.50	19.43	19.35	19.33	19.25	——	80
5	19.68	——	19.70	19.67	19.65	19.60	19.55	19.50	19.44	19.38	——	5
6	——	——	——	——	——	——	——	——	——	——	——	——
7	19.81	——	19.75	19.72	19.70	19.61	19.53	19.45	19.39	19.33	——	19
8	19.94	——	19.91	19.88	19.86	19.77	19.68	19.60	19.54	19.48	——	109
9	20.05	——	20.05	20.02	20.00	19.90	19.83	19.75	19.69	19.63	——	101
10	20.05	——	20.05	20.02	20.00	19.90	19.81	19.72	19.66	19.59	——	45

CHEMICAL MARKETS

New York, Oct. 11, 1940
All Prices F.O.B. Works

ACCELERATORS

Organic			
A-1 (Thiocarbanilid)	lb.	.24 @	.30
A-10	lb.	.31 @	.35
A-11	lb.	.52 @	.65
A-19	lb.	.52 @	.65
A-32	lb.	.70 @	.80
A-77	lb.	.42 @	.55
A-100	lb.	.42 @	.55
Aldehyde ammonia, crystals	lb.	.65 @	.70
Altax	lb.	.55 @	.60
Butyl Zimate	lb.	2.50 @	—
Captax	lb.	.50 @	.55
Crylene	lb.	.40 @	.47
Di-Ortho-Tolyguanidine	lb.	.44 @	.46
Diphenylguanidine	lb.	.35 @	.36
El-Sixty	lb.	.50 @	.65
Ethyl Zimate	lb.	2.50 @	—
Ethylidene aniline	lb.	.42 @	.43
Formaldehyde aniline	lb.	.31 @	—
Guantal	lb.	.40 @	.50
Hepteen	lb.	.35 @	.40
Hexamethylenetetramine	lb.	.33 @	—
Lead Oleate, No. 999	lb.	.13 @	—
Witco	lb.	.15 @	—
Monex	lb.	— @	2.35
Phenex	lb.	.50 @	.55
Pip-Pip	lb.	2.50 @	—
Pipsolene	lb.	1.55 @	1.85
R & H 50-D	lb.	.42 @	.43
R-2	lb.	1.40 @	1.80
R-2 Crystals	lb.	2.50 @	2.75
R-23	lb.	.40 @	—
RN-2	lb.	1.40 @	1.80
RN-2 Crystals	lb.	2.00 @	2.25
Rotax	lb.	.60 @	.65
Safex	lb.	1.20 @	1.30
SPDX	lb.	.70 @	.75
Super-Sulphur No. 1	lb.	.50 @	—
No. 2	lb.	.18 @	.25
Thiocarbanilid, drums	lb.	.24 @	.30
Thiurad	lb.	— @	2.35
Trimene	lb.	.55 @	.65
base	lb.	1.05 @	1.20
Triphenylguanidine	lb.	.45 @	—
Tuads	lb.	2.35 @	—
Ulto	lb.	1.25 @	1.75
Ureka	lb.	.60 @	.75
Blend B	lb.	.60 @	.75
Blend C	lb.	.56 @	.65
Vulcanex	lb.	.42 @	.43
Vulcanol	lb.	.85 @	—
Zimate	lb.	2.35 @	—
Inorganic			
Litharge, domestic	lb.	.07 @	.07½
Magnesia, calcined, heavy	lb.	.04 @	—

COLORS

Blacks (See Next Column)			
Blues			
Prussian	lb.	.33 @	.35
Ultramarine	lb.	.11 @	.16
Browns			
Mapico	lb.	.11 @	—
Umber, Turkey	lb.	.04¼ @	.05
Greens			
Chrome	lb.	.21 @	.30
Guignet's Green	lb.	.70 @	—
Reds			
Antimony			
crimson, 15/17	lb.	— @	—
sulfur, free	lb.	— @	—
Indian	lb.	.08¾ @	—
Domestic (Maroon)	lb.	.11 @	—
Mapico	lb.	.09¾ @	—
Red oxide, pure	lb.	.10 @	.12
Rub-Er-Red	lb.	.09¾ @	—
Whites			
Cryptone, No. 19	lb.	.05 @	.05¼
Cryptone CB, No. 21	lb.	.05 @	.05¼
Cryptone, ZS-230	lb.	.07½ @	.07¾
Cryptone, ZS-86	lb.	.07½ @	.07¾
Lithopone			
Albalith, black label-11	lb.	.0360@	.0385
Azolith	lb.	.0360@	.0385
Ray-bar	lb.	.05¼ @	.05¾
Ray-cal	lb.	.05¼ @	.05¾
Rayox	lb.	.13 @	—
Titanox A	lb.	.13 @	.13¾
Titanox B	lb.	.05¼ @	.05½
Titanox C	lb.	.05 @	.05¼
Zinc Oxide—American Process			
American Azo:			
ZZZ (lead free)	lb.	.06½ @	.06¾
Anaconda, lead free	lb.	.06½ @	.06¾
Horsehead Lead Free Brand:			
Special—3	lb.	.06½ @	.06¾
XX Red—4	lb.	.06½ @	.06¾
XX Red—72	lb.	.06½ @	.06¾
XX Red—78	lb.	.06½ @	.06¾
XX Red—103	lb.	.06½ @	.06¾
Kadox, black label—15	lb.	.06½ @	.06¾
Red label—17	lb.	.06½ @	.06¾
St. Joe, black label	lb.	.06½ @	.06¾
green label	lb.	.06½ @	.06¾
red label	lb.	.06½ @	.06¾
U. S. P.—7, bbls.	lb.	.09½ @	.09¾
Zinc Oxide—French Process:			
Florence White Seal—7 bbls.	lb.	.08½ @	.08¾
Green seal—8	lb.	.08 @	.08¼
Red seal—9	lb.	.07½ @	.07¾
Yellows			
Cadmolith	lb.	.50 @	.55
Chrome	lb.	.13½ @	.15½
Mapico	lb.	.06¾ @	—

BLACKS
(In bags, carload lots)

Aerfloted Arrow	lb.	.02925@	—
Certified	lb.	.02925@	—
Certified Spheron	lb.	.02925@	—
Continental	lb.	.02925@	—
Disperso	lb.	.02925@	—
Dixiedensed	lb.	.02925@	—
Dixiedensed 66	lb.	.02925@	—
Excello	lb.	.02925@	—
Fumonex	lb.	.03 @	—
Fumonex Beads	lb.	.03 @	—
Gastex	lb.	.03 @	—
Kosmobile	lb.	.02925@	—
Kosmobile 66	lb.	.02925@	—
Micronex (Amarillo)	lb.	.02925@	—
Micronex Beads (Amarillo)	lb.	.02925@	—
Pelletex	lb.	.03 @	—
P-33	lb.	.0475 @	—
Supreme	lb.	.02925@	—
Thermax	lb.	.02 @	—
Wyex	lb.	.02925@	—

COMPOUNDING MATERIALS

Aluminum Flake	ton	21.85	@24.50
Asbestine	ton	14.00	@16.00
Barium carbonate (98-100%)	ton	47.00	@49.00
Barytes	ton	22.85	@ —
Bentonite	ton	11.00	@16.00
Blanc fixe, dry	ton	50.00	@62.50
Calcene	ton	37.50	@43.00
Catalpo (fact.)	lb.	.02 @	—
Chalk, precipitated			
Suprex white, extra lt.	ton	45.00	@60.00
heavy	ton	45.00	@55.00
Clay, Aerfloted, Suprex	ton	10.00	@22.00
Crown (f.o.b. plant)	ton	10.00	@ —
Dixie	ton	10.00	@22.50
Langford	ton	—	@ 8.50
McNamee	ton	10.00	@22.50
Par	ton	10.00	@22.50
Witco	ton	10.00	@ —
Cotton Flock (Dark)	lb.	.10½ @	.13
Kalite No. 1	ton	24.00	@30.00
Kalite No. 3	ton	34.00	@40.00
Kalvan	ton	95.00	@121.00
Magnesium carbonate	lb.	.07½ @	.09½
Mica	ton	35.00	@44.00
Mineralite	ton	—	@30.00
Pyrax A	ton	6.00	@20.00
Rottenstone (powd. Dom.)	ton	25.50	@37.50
Silene (calcium silicate)	lb.	.04 @	.045
Starch, powdered	cwt.	2.90 @	4.10
Talc, domestic	ton	17.00	@25.00
Whiting, commercial	ton	16.00	@26.00
Columbia Filler	ton	9.00	@14.00
Witco	ton	6.00	@ —
Wood Flour	ton	24.00	@25.00

MINERAL RUBBER

285°-300° Mineral Rubber	ton	23.00	@42.00
Black Diamond	ton	25.00	@ —
Genasco, solid (factory)	ton	—	@ —
Hard Hydrocarbon	ton	23.00	@ —
Parmr, solid	ton	—	@ —
Pioneer, MR, solid	ton	—	@ —

MISCELLANEOUS

Aromatics—Rodo #0	lb.	3.50 @	4.00
Rodo #10	lb.	4.50 @	5.00
Curodex 19	lb.	2.75 @	—
Curodex 188	lb.	3.50 @	—
Curodex 198	lb.	4.50 @	—
Para-Dors	lb.	4.50 @	—
Aresklene No. 375 (dispersing, wetting and penetrating agent)	lb.	.35 @	.50
Darvan (dispersing agent)	lb.	.30 @	.39
Santomerse S (dispersing, wetting, penetrating and stabilizing agent)	lb.	.11 @	.25
Sponge Paste	lb.	— @	.18
Sunproof	lb.	.22 @	.27
Tackol (tackifier)	lb.	.085 @	.18
Tonox	lb.	.52 @	.61
Ty-Ply R (and S)	gal.	6.75 @	10.75
Unicel (blowing agent)	lb.	.50 @	—

SOFTENERS

Acids			
Acetic, 28%, bbls.	100 lb.	2.23 @	2.48
Nitric, 36 degrees	cwt.	5.00 @	5.95
Acids, Fatty			
Laurex	lb.	.10½ @	.12¾
SL #10	lb.	.12 @	.14
Stearex Beads	lb.	.08 @	.09
Stearic, double pressed	lb.	.12½ @	.13½
Stearite	lb.	.08 @	—
Alkalies			
Caustic Soda, 76%	cwt.	2.30 @	3.55
Soda Ash, 58%	cwt.	1.10 @	2.93
Oils			
Cycline Oil	gal.	.14 @	.20
Degras, bbls.	lb.	.06 @	.06½
Fluxrite	lb.	.05½ @	.06½
Para-Flux	gal.	.08½ @	.18
Para-Lube	lb.	.425 @	.48
Petrolatum, amber	lb.	.02¾ @	.03¾
Pigmentaroil, tank cars	gal.	.16 @	—
in drums	gal.	.22½ @	.23½
Pine, steam distilled	gal.	.54 @	.59
Rosin Oil, cmpd.	gal.	.40 @	—
Rubberol	lb.	.13½ @	.14
Rubtack	lb.	.10 @	—
Seedine, c.l.	lb.	.07¼ @	—
Tackol	lb.	.08½ @	.18
Witco Palm Oil	lb.	— @	—
Witco Softener No. 20	gal.	.20 @	—
Woburn No. 8, c.l.	lb.	.06 @	—
Resins and Pitches			
Pitch, Burgundy	lb.	.05½ @	.06
coal tar	ton	19.00	@22.00
hardwood	ton	16.00	@22.50
pine, 200 lb. gr. wt.	bbl.	6.00	@ 6.50
Pigmentar, tank cars	gal.	.16 @	—
in drums	gal.	.22½ @	.23½
R. S. L. Resin		— @	—
Retort Pine Tar, drums	ton	20.00	@26.00
Solvents			
Acetone, pure	lb.	.05 @	.07
Benzene, 90%, tank car	gal.	.14 @	—
Beta-Trichlorethane	gal.	— @	.20
Bondogen	lb.	.98 @	1.25
Carbon, bisulfide	lb.	.05 @	.08½
Carbon tetrachloride	gal.	.66½ @	1.17
Dichlorethylene	lb.	— @	—
Dipentene, cml., drums	gal.	.38 @	.50
Ethylene dichloride	lb.	.06 @	.07½
Plastogen	lb.	.07¾ @	.12
Reogen (drums)	lb.	.11½ @	.26
Rub-Sol	gal.	.09½ @	—
Trichlorethylene	lb.	.08 @	.09½
Turpentine, spirits	gal.	.36 @	.40
dest. dist., drums	gal.	.21 @	.26
Waxes			
Beeswax, white	lb.	.35 @	.37
Carnauba, yellow	lb.	.71 @	.74
Ceresin, white, dom	lb.	.11½ @	—
Montan, crude	lb.	— @	—
Paraffin (c.l.—f.o.b. N. Y.)			
Yellow crude scale, 122/124	lb.	.02½ @	—
Refined, 123/125	lb.	.05¾ @	.06¼

ANTI-OXIDANTS

Agerite Alba	lb.	1.50 @	1.95
Exel	lb.	1.00 @	1.02
Gel	lb.	.57 @	.59
Hipar	lb.	.65 @	.67
Powder	lb.	.52 @	.54
Resin	lb.	.52 @	.54
Resin D	lb.	.52 @	.54
White	lb.	1.25 @	1.60
Albasan	lb.	.70 @	.75
Antox	lb.	— @	.56
B-L-E	lb.	.52 @	.65
Flectol B	lb.	.52 @	.65
Flectol H	lb.	.52 @	.65
Flectol White	lb.	.90 @	1.15
Neozone A, B, C, D, E	lb.	.52 @	.63
Oxynone	lb.	.64 @	.80
Retardex	lb.	.45 @	.48
Santoflex B	lb.	.52 @	.65
Santovar A	lb.	1.15 @	1.40
S.C.R.	lb.	.33 @	.35
Stabilite	lb.	.52 @	.54
Stabilite Alba	lb.	.70 @	.75
VGB	lb.	.52 @	.61

MOLD LUBRICANTS

Aresklene	lb.	.35 @	.50
Cocoa Soapstock	lb.	.06 @	.08
Dipex	lb.	.06 @	.08
Lubrex	lb.	.25 @	.30
Mineralite	ton	— @	30.00
Mold Paste	lb.	.12 @	.18
Rubberol	lb.	.13½ @	.14
Sericite	ton	65.00 @	75.00
Soap Tree Bark, cut, sifted	lb.	.06 @	.08

FACTICE OR RUBBER SUBSTITUTES

Amberex	lb.	.25 @	—
Amberex Type B	lb.	.18¾ @	—
Black	lb.	.08 @	.12
White	lb.	.08½ @	.13½
Brown	lb.	.08 @	.11½
Neophax A	lb.	.09 @	—

VULCANIZING INGREDIENTS

Dispersed Sulfur No. 2	lb.	.07½ @	.15
Sulfur Chloride, yellow (drs.)	lb.	.035 @	.04
Sulfur, rubber makers			
Refined (bags)	cwt.	2.35 @	2.70
Commercial (bags)	cwt.	2.00 @	2.35
Telloy	lb.	1.75 @	—
Vandex	lb.	1.75 @	—

STATISTICS

Crude Rubber — Latex & Guayule — Reclaim — Tires & Tubes — Automobiles — Rims — Gasoline — Cotton Prices

U. S. Imports and Exports of Crude Rubber

YEARS	Gross Imports: Long Tons	Gross Imports: Total Declared Value	Gross Imports: Average Declared Value per pound Cents	Re-exports: Long Tons	Re-exports: Total Declared Value	Re-exports: Average Declared Value per pound Cents	Net Imports: Long Tons
1924	325,899	173,367,272	23.75	10,309	6,057,637	26.23	315,590
1925	393,370	426,167,504	48.36	14,827	19,847,753	59.76	378,543
1926	409,944	501,131,064	54.57	17,671	22,470,583	56.77	392,273
1927	424,733	338,688,492	35.60	27,775	24,735,488	39.76	396,958
1928	432,633	242,727,423	25.05	32,159	18,128,761	25.17	400,474
1929	560,082	239,177,811	19.06	36,485	16,868,718	20.64	523,597
1930	482,083	139,133,048	12.88	30,205	9,310,205	13.76	451,878
1931	497,176	72,922,845	6.55	25,595	4,255,572	7.42	471,581
1932	409,556	31,936,459	3.48	20,930	2,015,612	4.30	388,626
1933	407,817	44,034,064	4.82	20,537	2,601,352	5.65	387,280
1934	449,513	97,929,676	9.73	23,848	5,770,109	10.80	425,665
1935	453,134	115,299,448	11.36	11,389	3,084,331	12.09	441,745
1936	467,064	152,072,496	14.54	12,581	4,488,223	15.93	454,483
1937	574,600	237,307,041	18.44	7,902	3,385,433	19.02	566,698
1938	397,620	125,357,730	14.07	5,652	1,799,124	14.21	391,968
1939	469,803	167,558,245	15.92	13,125	5,832,618	19.84	456,678
1939:							
July	34,288	12,071,105	15.72	440	164,428	16.69	33,848
Aug.	35,794	12,702,958	15.84	267	89,741	15.01	35,527
Sept.	35,006	12,667,740	16.16	1,472	659,055	19.98	33,534
Oct.	42,784	15,211,621	15.87	5,886	2,881,172	21.85	36,898
Nov.	39,422	14,555,150	16.48	1,228	539,763	19.63	38,194
Dec.	68,384	25,861,354	16.88	1,116	529,759	21.20	67,268
1940:							
Jan.	68,962	26,314,500	17.03	955	447,673	20.92	68,007
Feb.	40,603	15,578,517	17.13	1,291	599,819	20.74	39,312
Mar.	55,517	21,845,290	17.57	975	447,460	20.49	54,542
April	66,622	26,176,442	17.54	565	252,638	19.98	66,057
May	47,559	18,511,955	17.38	821	301,914	16.41	46,738
June	51,074	20,019,581	17.50	623	295,334	21.15	50,451
July	66,931	26,426,632	17.63	100	49,828	22.20	66,831
Aug.	70,453	27,608,883	17.49	416	183,369	19.69	70,037

Note: "Gross Imports" do not include latex or guayule. To secure more accurate figures for "Net Imports" latex and guayule figures (shown below) should be added and the re-export figure deducted from the total. Annual figures for 1922, however, include both latex and guayule; guayule only is included in 1923. Annual figures for 1922-36 were revised in February, 1937.

United States Imports of Guayule, Balata, Jelutong, Liquid Latex

(All Quantities in Long Tons)

	Guayule Tons	Guayule Dollars	Balata Tons	Balata Dollars	Jelutong Tons	Jelutong Dollars	Liquid Latex (1) Tons	Liquid Latex (1) Dollars
1924	1,356	536,392	464	568,456	6,165	1,237,100	2,157	864,059
1925	3,781	1,803,448	517	574,750	6,749	1,642,531	3,272	3,537,510
1926	4,305	2,562,096	354	327,213	7,263	3,127,757	3,394	4,686,743
1927	5,018	2,674,957	582	477,246	7,785	2,448,657	1,495	1,170,650
1928	3,077	1,755,685	731	430,855	7,552	2,540,059	4,007	2,121,786
1929	1,275	545,175	728	566,964	8,204	2,458,126	3,729	1,788,391
1930	1,096	347,388	502	422,684	5,907	1,403,244	4,458	1,508,786
1931	....	.....	1,207	411,380	5,777	1,019,010	4,675	888,909
1932	....	.....	707	147,403	4,607	616,596	5,112	601,999
1933	....	.....	1,659	2,261,869	5,990	944,895	11,085	1,833,671
1934	398	75,349	1,054	438,209	4,987	943,752	13,107	3,643,221
1935	459	86,835	615	188,384	5,644	1,063,126	13,553	3,782,222
1936	1,229	286,552	535	199,368	6,163	1,296,364	19,852	6,659,899
1937	2,694	745,873	354	151,344	7,109	2,017,786	23,185	10,213,670
1938	2,485	623,819	509	181,140	9,132	2,944,504	11,878	4,147,318
1939	2,232	463,345	694	265,553	6,640	1,603,418	27,438	10,467,552
1939:								
July	150	32,626	39	18,813	663	141,540	2,934	1,064,927
Aug.	178	38,687	28	8,689	742	208,156	2,614	1,001,013
Sept.	133	30,091	36	19,682	479	100,285	2,525	965,615
Oct.	282	61,376	107	43,267	465	127,084	2,555	968,207
Nov.	214	46,558	96	37,858	289	74,358	3,071	1,227,788
Dec.	236	51,521	64	38,781	477	126,548	2,779	1,127,924
1940:								
Jan.	128	27,901	34	19,478	612	155,570	3,410	1,412,728
Feb.	314	70,251	55	26,420	461	134,878	2,171	947,524
Mar.	365	81,181	45	20,895	542	162,493	3,376	1,473,056
April	314	65,313	50	18,289	506	176,064	3,763	1,608,156
May	289	57,578	60	20,503	495	158,713	3,584	1,523,879
June	365	74,957	47	10,977	390	146,196	2,451	1,004,007
July	262	53,058	65	20,553	336	115,599	2,281	993,411
Aug.	297	59,464	61	22,638	701	276,642	2,278	1,022,531

(1) Weight given in pounds of dry rubber contained in latex.

Note: Annual figures for 1924-1936 revised on basis of information received on February 8, 1937.

U. S. Consumption of Crude Rubber

(Including Latex)

Figures on Monthly Basis

	1933	1934	1935	1936	1937	1938	1939	1940
Jan.	22,645	39,190	46,636	48,631	50,879	31,265	47,387	54,978
Feb.	21,392	40,515	42,720	36,841	51,950	25,357	43,422	49,832
Mar.	17,843	47,003	42,153	42,813	54,129	32,389	51,416	50,192
Apr.	25,928	44,853	44,247	52,031	51,859	29,730	45,268	50,103
May	44,074	42,918	41,101	50,612	51,795	30,753	45,484	51,619
June	50,743	40,147	36,156	52,772	51,860	32,540	48,438	46,506
July	49,614	32,553	35,917	48,250	43,703	34,219	44,975	47,011
Aug.	44,428	33,216	38,775	46,777	41,506	40,552	51,740	50,477
Sept.	35,281	30,258	37,086	46,449	43,945	40,183	51,402	.....
Oct.	31,543	31,253	41,969	49,637	38,754	42,850	57,155	.....
Nov.	28,831	34,748	42,310	50,433	34,025	49,050	55,677	.....
Dec.	28,757	36,569	42,474	49,754	29,195	48,143	49,636	.....
Tot.	401,079	453,223	491,544	575,000	543,600	437,031	592,000	.....

Note: The above figures are based on the annual surveys conducted by the Leather and Rubber Division, Bureau of Foreign & Domestic Commerce, Washington, D. C., with the exception of those for the current year which are estimates made by the Rubber Manufacturers Association. They are revised frequently and the latest available issue should always be consulted for the most reliable figures.

Reclaimed Rubber in the United States

(All Quantities in Long Tons)

Year	Production	Consumption Tons	Consumption % to Crude	Stocks	Year	Production	Consumption Tons	Consumption % to Crude	Stocks
1930	157,968	153,500	40.9	22,000	1935	122,948	117,523	23.9	17,000
1931	129,690	123,000	35.1	21,714	1936	150,571	141,486	24.6	19,000
1932	75,656	77,500	23.3	16,334	1937	185,033	162,000	29.8	28,800
1933	93,587	85,000	21.2	17,780	1938	122,400	120,800	29.9	23,000
1934	108,162	100,855	22.3	20,000	1939	186,000	170,000	28.7	25,250

Figures on Monthly Basis

1939									
Jan.	13,870	12,633	26.7	22,350	July	11,777	12,448	27.7	21,269
Feb.	13,193	12,269	28.3	22,644	Aug.	16,461	15,485	29.9	21,402
Mar.	14,638	14,888	29.0	21,638	Sep.	16,830	15,583	30.3	21,384
Apr.	13,591	12,309	27.2	22,172	Oct.	19,549	17,423	30.5	21,694
May	13,817	12,425	27.3	22,556	Nov.	19,417	16,551	29.7	23,239
June	14,848	13,669	28.2	22,976	Dec.	18,009	14,317	28.8	25,250
1940:									
Jan.	19,297	16,070	29.2	27,418	July	14,342	14,298	30.4	28,058
Feb.	17,992	15,370	30.8	28,603	Aug.	17,213	14,224	28.2	29,786
Mar.	17,234	15,931	31.7	28,488	Sep.	.....	.....	...	.....
Apr.	16,568	16,298	32.5	27,558	Oct.	.....	.....	...	.....
May	17,552	15,719	30.5	28,397	Nov.	.....	.....	...	.....
June	16,631	15,844	34.1	28,327	Dec.	.....	.....	...	.....

Note: The above figures are based on the annual surveys conducted by the Leather and Rubber Division, Bureau of Foreign & Domestic Commerce, Washington, D. C., with the exception of those for the current year which are estimates made by the Rubber Manufacturers Association. They are revised frequently and the latest available issue should always be consulted for the most reliable figures. The annual figures are more accurate. Stocks shown are those on hand at the end of the indicated month or year.

U. S. Consumption of Gasoline

(Bureau of Mines Statistics)

(In Thousands of Barrels of 42 Gallons)

	1938	1939	1940		1938	1939	1940
January	35,323	37,767*	40,370	August	50,549	53,828*	55,346
February	31,981	34,595	37,557	September	46,150	49,347	.....
March	41,409	42,520	44,607	October	46,365	49,687	.....
April	43,430	43,977	47,683	November	45,084	47,275	.....
May	44,937	49,547	52,946	December	41,742	43,694	.....
June	48,383	49,812	55,459				
July	47,650	50,508	53,865	Total	523,003	552,557*	.....

* Revised.

Rims Inspected and Passed in U. S.

(Tire and Rim Association Reports)

	Total		Total		Total
1928	24,247,282	1932	6,261,336	1936	20,790,192
1929	24,141,502	1933	8,713,962	1937	22,257,964
1930	17,364,096	1934	12,255,118	1938	10,612,138
1931	11,253,800	1935	18,664,107	1939	17,471,914

1940		1940		1940	
January ...	2,163,914	May	1,743,786	September .	1,355,924
February ..	1,850,383	June	1,266,300	October ...	.....
March	1,918,241	July	825,089	November ..	.....
April	1,822,686	August	1,075,469	December ..	.....

Daily Spot Closing Prices of Ribbed Smoked Sheet Rubber—*New York Market, in Cents per Pound*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Ave.
1938																																
July	15¼	—	15⅛	15⅛	14¾	15⅛	15⅛	15⅜	—	—	14¾	15⅜	15⅛	14⅞	15⅛	—	—	15⅛	15⅛	15⅛	15⅛	15⅛	—	—	—	—	—	16¼	—	16⅛	—	15⅛
August	15⅛	—	—	—	16	—	—	16⅛	—	15⅛	15⅛	15⅜	—	15⅛	15⅛	—	—	15⅛	15⅛	15⅛	—	—	—	16⅛	—	—	—	—	—	16⅛	—	15⅝
Sept.	16⅛	—	—	15⅛	—	16⅛	—	16⅛	—	15⅛	15⅛	16⅛	—	15⅛	15⅛	15⅝	—	16⅛	16⅛	16⅛	—	—	—	—	—	—	—	—	—	—	—	16⅛
Oct.	16⅛	—	—	16⅛	17	16⅛	—	17⅛	—	16⅛	17⅛	—	16⅛	17⅛	16⅛	16⅛	—	16⅛	16⅛	16⅛	—	—	—	—	—	—	—	—	—	—	—	16⅛
Nov.	16⅛	—	16⅛	16⅛	17	16⅛	—	17⅛	—	16⅛	—	—	16⅛	17⅛	16⅛	16⅛	—	16⅛	16⅛	16⅛	—	—	—	—	—	—	—	—	—	—	—	16⅛
Dec.	15⅝	—	15⅛	—	15⅛	15⅝	16⅛	15⅝	15⅛	16	—	15⅛	15⅝	16	15⅛	16	—	16⅛	16⅛	16⅛	—	—	—	—	—	—	—	—	—	—	—	16⅛
1939																																
Jan.	—	—	16⅛	16⅛	—	—	—	15⅛	15⅛	16	15⅛	15⅜	15⅛	15⅜	—	16⅛	15⅜	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	14⅛	—	—	—	15⅝	15⅛	15⅛
Feb.	—	—	15⅜	16⅛	—	15⅛	16⅛	15⅛	15⅛	15⅝	15⅛	—	15⅛	15⅛	16⅛	16⅛	16⅛	16⅛	—	15⅜	15⅛	15⅛	15⅛	15⅛	15⅛	—	15⅛	16⅛	—	—	—	16
March	—	—	16⅛	16⅛	—	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	15⅛	16⅛	16⅛	16⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛
April	—	—	16⅛	16⅛	—	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
May	—	—	16⅛	16⅛	—	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
June	—	—	16⅛	16⅛	—	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
July	—	—	16⅛	16⅛	—	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
August	—	—	16⅛	16⅛	—	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
September	—	—	19⅛	—	—	—	—	—	22	—	—	23	—	22	22	—	—	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	21⅝
October	—	—	20	20⅛	—	—	—	—	—	—	—	20⅛	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
November	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
December	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1940																																
January	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
February	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
March	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
April	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
May	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
June	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
July	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
August	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
September	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
October	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Average Spot Closing Prices—Ribbed Smoked Sheets

(New York Markets)

Average Price per Pound for Years 1913-1932

Year	Cents	Year	Cents	Year	Cents	Year	Cents	Year	Cents
1913	82.04	1917	72.23	1921	16.36	1925	72.46	1929	20.59
1914	65.33	1918	60.15	1922	17.50	1926	48.50	1930	11.98
1915	65.85	1919	48.70	1923	29.45	1927	37.72	1931	6.17
1916	72.50	1920	36.30	1924	26.20	1928	22.48	1932	3.49

Average Monthly Price per Pound Since 1933

	1933 Cents	1934 Cents	1935 Cents	1936 Cents	1937 Cents	1938 Cents	1939 Cents	1940 Cents
Jan.	3.08	9.32	13.10	14.35	21.37	14.63	15.75	19.06
Feb.	2.95	10.45	12.92	15.48	21.33	14.71	15.93	18.83
Mar.	3.01	11.01	11.51	15.89	24.09	13.55	16.26	18.58
Apr.	3.56	12.10	11.55	15.98	23.44	11.84	15.87	19.16
May	4.95	13.26	12.05	15.62	21.14	11.57	16.07	21.21
June	6.15	13.51	12.57	15.85	19.29	12.57	16.37	22.20
July	8.01	14.60	12.10	16.49	18.86	15.37	16.51	21.12
Aug.	7.31	15.47	11.98	16.25	18.37	16.08	16.67	19.62
Sept.	7.30	15.36	11.55	16.46	18.55	16.15	21.24	19.28
Oct.	7.64	13.96	12.62	16.55	16.28	16.89	19.89	
Nov.	8.66	13.04	13.15	17.97	14.60	16.24	20.21	
Dec.	8.87	12.98	13.28	20.01	15.41	16.05	20.01	
Average for Year	5.96	12.92	12.37	16.41	19.39	14.64	17.57	

London Closing Prices of Ribbed Smoked Sheets

(In Pence Per Pound)

Day	1940 July	1940 Aug.	1940 Sept.	1940 Oct.	Day	1940 July	1940 Aug.	1940 Sept.	1940 Oct.
1	12⅜	13	——	11 1/16	17	12 1/16	——	12	
2	13	12 11/16	12⅛	11⅛	18	12⅛	——	11⅞	
3	12⅞	——	12	11⅛	19	12⅛	13	11 1/16	
4	12½	——	12 1/16	11 1/16	20	——	12 11/16	11⅞	
5	12½	12 1/16	12⅛	——	21	——	——	——	
6	——	13 1/16	12⅛	——	22	12⅛	12⅝	——	
7	——	13⅛	——	11 1/16	23	12¼	12⅝	11⅞	
8	12½	13	——	11⅞	24	12⅛	——	11 1/16	
9	12½	13	12⅛	11⅞	25	12⅛	——	11¾	
10	12½	——	12¼	11 1/16	26	12⅛	12⅛	11⅝	
11	12½	——	12⅛	——	27	——	12½	11⅛	
12	12¼	13 1/16	12⅛	——	28	——	12¼	——	
13	——	13⅛	12 1/16	——	29	12 7/16	12¼	——	
14	——	13⅛	——	——	30	12⅝	12⅛	11¾	
15	12	13	——	——	31	12⅜	——	——	
16	11⅞	13	12						

Average Monthly Price Per Pound

Month	1937 Pence	1938 Pence	1939 Pence	1940 Pence	Month	1937 Pence	1938 Pence	1939 Pence	1940 Pence
Jan.	10.378	7.077	7.926	11.793	Aug.	8.830	7.841	8.545	12.818
Feb.	10.503	7.029	7.942	12.577	Sept.	8.935	7.918	9.634	11.964
Mar.	11.766	6.590	8.120	11.651	Oct.	7.855	8.355	10.177	
Apr.	11.471	5.793	7.910	10.980	Nov.	7.080	8.111	11.210	
May	10.250	5.632	8.002	11.600	Dec.	7.332	8.005	11.559	
June	9.548	6.147	8.216	13.046	Average for Year	9.424	7.164	8.959	
July	9.136	7.464	8.271	12.410					

Note: No quotations were made in the London market from June 17 through June 30. Accordingly, the average for the month is based on the first eleven trading days only.

Spot Closing Cotton Prices

(Middling Upland Grade—New York Market)

Recent Daily Price Per Pound

Date	1940 Aug.	1940 Sept.	1940 Oct.	Date	1940 Aug.	1940 Sept.	1940 Oct.	Date	1940 Aug.	1940 Sept.	1940 Oct.
1	10.17	——	9.69	11	——	9.63		22	9.74	——	
2	10.18	——	9.71	12	9.89	9.64		23	9.66	9.70	
3	10.16	9.78	9.71	13	9.84	9.62		24	9.69	9.73	
4	——	9.79	9.74	14	9.77	9.61		25	——	9.77	
5	10.11	9.78	9.75	15	9.81	——		26	9.70	9.84	
6	10.06	9.72	——	16	9.72	9.61		27	9.65	9.71	
7	10.02	9.57	9.72	17	9.71	9.61		28	9.69	9.77	
8	10.08	——	9.71	18	——	9.63		29	9.69	——	
9	9.98	9.64	9.67	19	9.69	9.65		30	9.73	9.69	
10	9.87	9.62	9.59	20	9.78	9.69		31	9.71	——	
				21	9.78	9.70					

Average Monthly Price Per Pound

	1937 Cents	1938 Cents	1939 Cents	1940 Cents		1937 Cents	1938 Cents	1939 Cents	1940 Cents
Jan.	13.06	8.57	8.94	11.19	Aug.	10.41	8.41	9.30	9.84
Feb.	13.15	8.91	8.97	11.10	Sept.	9.02	8.17	9.30	9.69
Mar.	14.46	8.92	9.00	10.90	Oct.	8.42	8.61	9.24	
Apr.	14.23	8.76	8.87	10.89	Nov.	7.96	9.08	9.73	
May	13.34	8.50	9.56	10.33	Dec.	8.26	8.72	10.97	
June	12.70	8.38	9.88	10.72	Average for Year	11.44	8.66	9.46	
July	12.26	8.85	9.71	10.42					

Stocks of Crude Rubber

(All figures are in long tons)

ON HAND OR AFLOAT TO THE U. S.

End of:	ON HAND 1938	1939	1940	AFLOAT 1938	1939	1940	ON HAND AND AFLOAT 1938	1939	1940
Jan.	276,497	220,727	142,368	57,356	48,210	90,285	333,853	268,937	232,653
Feb.	292,067	207,882	134,328	47,459	55,814	112,257	339,526	263,696	246,585
Mar.	301,762	201,752	142,414	41,882	55,981	113,619	343,644	257,733	256,033
Apr.	303,901	188,074	162,459	39,071	57,918	102,557	342,972	245,992	265,016
May	300,907	187,980	161,446	32,859	54,046	109,364	333,766	242,026	270,810
June	294,796	173,493	168,235	32,079	51,274	119,138	326,875	224,767	287,373
July	282,785	165,450	190,222	40,400	52,990	139,629	323,185	218,440	329,851
Aug.	273,841	152,029	212,774	47,772	66,717	141,286	321,613	218,746	354,060
Sept.	268,094	136,824		48,927	68,310		317,021	205,134	
Oct.	259,074	119,404		51,062	100,500		310,136	219,904	
Nov.	242,592	105,205		51,114	114,044		293,706	219,249	
Dec.	231,500	125,800		45,105	91,095		276,605	216,895	

STOCKS IN GREAT BRITAIN

(No. of Tons in Wharves and Warehouses, not including Latex)

At end of	London 1938	1939	1940	Liverpool 1938	1939	1940
January	40,203	51,420	12,000*	21,711	28,789	8,000*
February	46,596	48,312	10,000*	24,737	26,784	7,000*
March	50,233	46,768	10,000*	26,220	24,996	8,000*
April	54,296	44,760	12,000*	28,277	23,742	10,000*
May	57,194	43,454	12,000*	29,862	22,211	9,000*
June	60,307	42,374	11,000*	31,837	21,176	8,500*
July	62,236	37,772	15,500*	32,825	19,116	11,000*
August	65,113	28,363	20,000*	34,315	16,218	16,000*
September	63,321	24,965*		34,645	14,054*	
October	59,609	23,685*		33,483	13,336*	
November	57,794	23,244*		32,116	13,087*	
December	55,668	19,545*		31,012	11,006*	

* Estimated.

(Figures up to August, 1939, from the Rubber Trade Association of London)

STOCKS IN OTHER CENTRES

(Figures from Statistical Bulletin of the Int'l Rubber Regulation Committee)

	Penang and Singapore [1]	Malaya [2]	Ceylon [3]	Holland	Para and Manaos
At end of 1939					
May	20,849	52,837*	4,005	136	1,966
June	19,563*	55,834	3,771	101	1,821
July	27,042	55,948	4,217	188	1,474
August	20,543*	50,625	3,134	315	1,914
September	23,457*	52,755	2,742	...	2,682
October	25,376*	46,264	3,335	...	3,419
November	22,957*	45,133	5,289	...	4,510
December	15,299*	54,868	5,149	...	5,336
At end of 1940					
January	35,928	60,504	5,755	....	2,862
February	33,563*	52,615	4,452	....	2,869
March	23,830*	48,180	3,369	....	3,246
April	42,239	50,636	4,749	....	2,715
May	32,731*	45,715	3,774	....	1,743
June	32,411	45,618	5,057	....	1,706
July	36,750	43,850	4,392	....	1,667

[1] Dealers' and Port Stocks. [2] Inside Regulated Areas. [3] Dealers' Stocks Only. * Revised.

RUBBER STOCKS AFLOAT

	Afloat for United States	Afloat for Europe	All Other * Afloat	Total * Afloat
End of: 1939				
August	66,717	30,000	23,283	120,000
September	68,310	30,000	35,690	134,000
October	100,500	35,000	37,500	173,000
November	114,044	35,000	21,956	171,000
December	91,095	35,000	25,905	152,000
End of: 1940				
January	90,285	40,000	44,715	175,000
February	112,257	40,000	40,743	193,000
March	113,619	45,000	52,381	211,000
April	102,557	45,000	40,443	188,000
May	109,364	45,000	55,636	210,000
June	119,138	50,000	65,862	235,000
July	139,629	55,000	55,371	250,000
August	141,286	55,000	53,714	250,000

* *Total afloat* is an arbitrary estimate based on number of months' shipments as adopted by the Department of Commerce. *All Other Afloat* is determined by subtracting the amount of stocks in transit to the United States and Europe from the estimated total.

TOTAL PRINCIPAL WORLD STOCKS

(Figures from the Survey of Current Business)

At End of:	1935	1936	1937*	1938*	1939	1940
January	698,153	600,479	454,249	549,762	497,665	433,841
February	686,195	599,355	445,265	565,833	479,578	429,551
March	678,809	583,318	447,856	586,666	460,723	447,472
April	677,006	567,172	428,249	586,291	438,252	465,345
May	677,569	541,871	413,134	568,158	429,979	470,981
June	671,525	520,255	434,250	573,136	407,640	500,774
July	679,061	519,074	445,782	580,654	418,639	547,708
August	680,644	500,520	457,462	565,394	397,345	579,119
September	661,509	493,585	470,768	551,447	396,867	.....
October	655,000	486,159	479,398	540,976	413,274	.....
November	617,300	466,491	493,266	512,196	395,217	.....
December	613,987	466,576	545,533	482,852	391,125	.....
Monthly Avge.	666,397	528,738	460,022	555,280	427,192	.....

* Revised.

U. S. Tire and Tube Statistics[1]

(All Figures Represent Thousands)

AUTOMOBILE CASINGS

Production Figures on Quarterly Basis

Quarter	1933	1934	1935	1936	1937	1938	1939	1940
Jan.-Mar.	6,635	13,437	13,355	11,376	15,565	7,314	13,946	14,849
Apr.-June	14,412	13,565	12,597	14,892	15,834	7,380	13,759	15,648
July-Sept.	14,707	9,822	11,312	14,914	12,207	10,794	15,182	.....
Oct.-Dec.	9,550	10,406	12,099	14,858	9,704	12,360	14,726	.....
Total	45,304	47,230	49,363	56,040	53,310	37,848	57,613	.....

Shipment Figures on Quarterly Basis

Quarter	1933	1934	1935	1936	1937	1938	1939	1940
Jan.-Mar.	6,981	10,730	11,154	10,554	14,143	7,388	12,445	12,728
Apr.-June	15,139	14,998	13,473	15,940	15,741	9,564	15,107	17,449
July-Sept.	13,707	11,648	13,489	14,037	13,106	11,243	15,791	.....
Oct.-Dec.	8,265	9,310	12,066	12,855	10,495	12,098	14,165	.....
Total	44,092	46,686	50,182	53,386	53,485	40,293	57,508	.....

Inventory Figures [2]

Quarter	1933	1934	1935	1936	1937	1938	1939	1940
Jan.-Mar.	7,290	11,651	11,675	8,762	12,004	10,547	9,963	10,747
Apr.-June	6,615	10,219	10,755	7,556	12,081	8,337	8,632	8,985
July-Sept.	7,595	8,419	8,288	8,690	11,200	7,859	8,080	.....
Oct.-Dec.	8,888	9,455	8,196	10,717	10,383	8,166	8,665	.....

Figures for Recent Months

	PRODUCTION 1938	1939	1940	SHIPMENTS 1938	1939	1940	INVENTORY [2] 1938	1939	1940
July	3,346	4,595	4,707	3,907	5,143	4,315	8,041	8,103	9,299
Aug.	4,111	5,511	4,621	4,011	4,990	4,174	8,217	8,691	9,732
Sept.	3,986	5,076	....	3,938	5,658	....	8,022	8,080	....

AUTOMOBILE INNER TUBES

Production Figures on Quarterly Basis

Quarter	1933	1934	1935	1936	1937	1938	1939	1940
Jan.-Mar.	6,230	12,823	12,553	11,891	15,831	7,314	12,383	12,815
Apr.-June	13,001	13,191	11,631	14,624	15,413	7,380	11,847	13,704
July-Sept.	14,356	10,321	11,270	15,320	12,038	10,794	13,118	.....
Oct.-Dec.	9,000	9,891	12,425	15,201	9,092	12,360	13,300	.....
Total	42,587	46,226	47,879	57,036	52,374	37,848	50,648	.....

Shipment Figures on Quarterly Basis

Quarter	1933	1934	1935	1936	1937	1938	1939	1940
Jan.-Mar.	6,539	10,640	11,252	11,367	14,606	7,387	11,422	11,684
Apr.-June	13,292	14,553	11,928	15,113	15,495	9,564	13,010	14,957
July-Sept.	13,370	11,545	13,251	15,069	12,901	11,243	13,449	.....
Oct.-Dec.	8,189	8,306	11,636	12,874	9,765	12,099	13,309	.....
Total	41,390	45,044	48,067	54,423	52,767	40,293	51,190	.....

Inventory Figures [2]

Quarter	1933	1934	1935	1936	1937	1938	1939	1940
Jan.-Mar.	6,369	10,244	10,406	8,660	11,993	10,547	8,752	8,247
Apr.-June	6,097	8,795	10,050	8,075	11,833	8,337	7,549	6,914
July-Sept.	7,008	7,639	7,565	8,595	11,326	7,859	7,206	.....
Oct.-Dec.	7,815	9,180	8,231	10,945	10,312	8,166	7,036	.....

Figures for Recent Months

	PRODUCTION 1938	1939	1940	SHIPMENTS 1938	1939	1940	INVENTORY [2] 1938	1939	1940
July	2,936	3,905	4,027	3,519	4,150	3,793	7,723	7,323	7,094
Aug.	4,026	4,757	4,314	3,744	4,309	3,600	8,029	7,799	7,807
Sept.	3,832	4,457	....	3,980	4,991	....	7,859	7,206	....

[1] These figures are based on reports received from the Rubber Manufacturers Association. They are revised frequently and the latest available issue should be consulted for most reliable figures.

[2] Stocks held by manufacturers at end of period indicated.

Automobile Production

Year	United States Total	Passenger Cars	Trucks	Canada Total	Passenger Cars	Trucks	Grand Total
1929	5,358,420	4,587,400	771,020	263,295	207,498	55,797	5,621,715
1930	3,355,986	2,814,452	540,534	154,192	125,442	28,750	3,510,178
1931	2,389,730	1,973,090	416,640	82,621	63,477	19,144	2,472,351
1932	1,370,678	1,135,493	235,187	60,816	50,718	10,098	1,431,494
1933	1,920,057	1,573,512	346,545	65,924	53,855	12,069	1,992,126
1934	2,753,111	2,177,919	575,192	116,852	92,647	24,205	2,869,963
1935	3,946,934	3,252,244	694,690	172,877	135,562	37,315	4,119,811
1936	4,454,115	3,669,528	784,587	162,159	128,369	33,790	4,616,274
1937	4,808,974	3,915,889	893,085	207,463	153,046	54,417	5,016,437
1938	2,489,085	2,000,985	488,100	166,086	123,761	42,325	2,655,171
1939*	3,577,292	2,866,796	710,496	155,316	108,806	46,510	3,732,608
1940							
Jan.*	432,279	362,897	69,382	17,213	12,579	4,634	449,492
Feb.*	404,032	337,756	66,276	18,193	12,779	5,414	422,225
Mar.*	423,620	352,922	70,698	16,612	12,025	4,587	440,232
Apr.	432,746	362,139	70,607	19,687	13,487	6,200	452,433
May	391,215	325,676	65,539	21,277	12,677	8,600	412,492
June	344,636	286,040	58,596	17,930	8,739	9,191	362,566
July	231,703	168,769	62,934	14,468	3,397	11,071	246,171
August	75,873	46,823	29,050	13,993	1,510	12,483	89,866
September	.....	.....	.....	.....	.....	.....	.....

* Revised.

Note: U. S. figures represent factory sales; Canadian figures represent production.

ADVERTISING PAGES REMOVED

Exports of Crude Rubber from Principal Producing Countries

(Long Tons)

	BRITISH MALAYA [1]							NETHERLAND INDIES [4]							
	Gross Exports	Imports	Net Exports	Ceylon [2]	India & Burma [3]	Sarawak [3]	British North Borneo [3]	Thailand [3]	Java & Madura	Sumatra E. Coast	Other N. I.	Indo-China [3]	Amazon Valley	All Other [3]	World Total [4]
1923	252,016	70,432	181,584	39,971	6,416	5,705	4,237	1,718	32,930	46,344	57,822	5,067	16,765	7,856	406,415
1924	259,706	108,524	151,182	39,997	7,697	6,699	4,621	2,962	42,446	54,497	80,347	6,688	23,165	9,065	429,366
1925	316,825	158,022	158,803	49,566	10,082	5,424	5,377	5,377	46,757	65,499	120,626	7,881	25,298	13,797	514,487
1926	391,328	151,243	240,085	58,962	9,874	9,155	6,079	4,027	52,186	71,413	121,231	8,203	24,298	16,017	621,536
1927	371,322	182,845	188,477	55,356	11,321	10,923	6,582	5,472	55,297	77,815	142,171	8,645	28,782	15,633	606,474
1928	409,430	149,787	259,643	57,267	10,790	10,087	6,698	4,813	58,848	82,511	121,770	9,548	21,129	10,690	653,794
1929	574,836	163,092	411,744	81,584	11,663	11,077	7,381	5,018	65,990	87,789	134,037	9,696	21,148	6,767	853,894
1930	347,043	133,876	413,167	76,970	10,782	10,309	6,781	4,251	69,755	79,396	115,254	7,665	14,260	5,651	814,241
1931	519,740	125,506	394,234	61,769	8,470	10,451	6,247	4,218	75,952	87,747	116,009	11,696	12,121	3,292	792,203
1932	478,252	92,539	385,713	48,973	3,888	6,960	4,664	3,451	61,312	79,837	85,871	13,883	6,450	1,816	702,818
1933	573,412	167,377	406,035	63,351	4,527	10,874	7,553	7,765	73,851	91,861	149,659	18,394	9,883	2,737	846,312
1934	677,361	211,803	465,558	79,746	10,492	17,233	11,103	17,545	87,400	112,058	175,470	20,170	8,903	2,985	1,008,663
1935	590,319	174,652	415,667	54,316	13,968	19,465	8,885	28,327	57,488	78,325	139,297	28,816	11,275	8,745	864,574
1936	520,286	167,799	352,487	49,692	14,724	21,243	8,177	33,702	61,307	84,577	152,205	40,782	14,193	11,466	845,431
1937	681,638	213,446	468,192	70,353	17,015	25,922	13,213	5,551	84,085	139,632	207,863	43,399	15,576	13,063	1,133,864
1938	526,911	156,101	370,810	49,528	15,178	17,792	9,512	41,080	57,526	94,501	145,909	58,518	14,618	12,920	887,892
1939	553,324	177,851	375,473	61,026	15,881	24,014	11,864	41,266	72,786	117,791	181,272	65,140	13,892	22,224	1,002,629
1939:															
May	42,214	12,697	29,517	2,805	1,670	1,649	558	2,782	4,105	8,168	12,155	4,585	874	1,672	70,540
June	31,541	9,567	21,974	3,708	1,435	1,157	332	1,748	5,839	8,846	12,824	4,030	591	1,825	64,309
July	45,962	20,052	25,910	5,019	1,285	3,092	1,603	5,599	5,229	11,020	19,431	3,367	1,019	1,804	84,378
Aug.	53,497	12,635	40,862	5,620	416	1,749	975	5,230	6,236	10,010	11,232	7,020	1,197	1,525	92,072
Sept.	45,094	18,302	26,792	6,064	780	1,932	429	4,670	5,168	10,278	22,270	5,943	1,131	1,832	87,289
Oct.	70,839	21,493	49,346	5,234	815	2,487	1,730	2,047	9,950	13,645	21,404	5,022	1,414	2,185	115,279
Nov.	49,276	13,657	35,619	4,405	819	2,023	1,322	1,428	5,827	10,239	14,163	6,540	1,055	2,191	85,631
Dec.	41,568	8,479	33,089	9,496	2,565	2,476	616	1,177	8,130	8,580	7,156	11,018	1,377	2,052	87,732
1940:															
Jan.	56,214	30,136	26,078	7,091	1,630	1,987	1,858	5,469	6,361	16,070	31,676	5,315	1,777	2,000*	107,212
Feb.	62,105	16,598	45,507	8,741	2,076	2,678	1,164	3,887	7,270	14,873	15,713	7,040	1,781	2,000*	112,376
Mar.	65,269	17,565	47,704	5,406	2,054	3,526	1,050	3,111	8,864	13,415	20,015	3,551	1,298	2,000*	111,994
Apr.	47,430	22,106	25,324	4,309	2,173	2,951	1,799	1,834	7,703	12,759	23,815	2,927	1,582	2,000*	89,206
May	74,682	16,946	57,736	7,274	2,229	2,696	1,370	2,582	8,416	11,904	20,009	4,578	3,413	2,000*	122,207
June	60,814	15,529	45,285	5,597	1,896	4,077	1,421	2,178	9,830	14,616	20,104	2,730	1,045	2,000*	110,779
July	70,360	27,625	42,735	7,580	1,567	2,494	1,767	4,253	4,023	26,598	5,672	4,000*	1,321	2,000*	128,010
Aug.	66,212	20,508	45,604	8,226	....	....	....	.....	.....	.....	.....	.....	.....	.....	.....

All figures from January, 1934, onward are net exports shown on a "dry rubber" basis as calculated by the International Rubber Regulation Committee. (1) Prior to January, 1934, Malayan net exports cannot be taken as production, since imported rubber is largely wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex also is not included in the early years, which on a dry rubber basis was as follows: 1924—1,117 tons; 1925—3,618; 1926—3,263; 1927—2,439; 1928—2,247; 1929—3,574; 1930—2,750; 1931—1,940; 1932—5,193; 1933—10,470, and 1934—14,172 tons. (2) Ceylon Chamber of Commerce statistics until 1926; rubber exported as latex is not included—such shipments on a dry rubber basis were: 1923—18 tons; 1924—90; 1925—6; 1926—20; 1927—½; 1928—1; 1929—2; 1930—11; 1931—2; 1932—2; 1933—1, and 1934—6 tons. (3) Official statistics. (4) Exports from "Other N. I." are chiefly wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex is not included in earlier years, which is as follows on a dry rubber basis: 1923—2,342 tons; 1924—1,008; 1925—2,239; 1926—44; 1927—84; 1928—1,395; 1929—437; 1930—2,744; 1931—3,874; 1932—3,488; 1933—5,260, and 1934—5,330 tons. (5) Calculated from official import statistics of principal consuming countries; also includes United States imports of guayule. (6) This total includes the third column for British Malaya and all other figures shown for other territories. (*) Figure is provisional.

NOTE: ANNUAL FIGURES ARE MORE ACCURATE; THEY ARE REVISED AT THE END OF THE FOLLOWING YEAR.

Net Imports of Crude Rubber into Principal Manufacturing Countries

(Long Tons)

	United States [1]	United Kingdom	France (h)	Germany	Canada (ac)	Japan (da)	Italy	Russia (ce)	Australia (ed)	Belgium (d)	Netherlands	Scandinavia (abcdf)	Spain (g)	Czecho-slovakia (abcd)	World Total
1919	238,407	42,671	17,685	5,584	6,395	9,753	9,894	75	1,002	3,995	2,771	3,149	2,418	9	343,808
1920	249,530	56,844	13,885	11,890	11,746	5,297	6,123	62	1,815	3,840	5,510	2,292	2,008	567	371,409
1921	179,736	42,087	15,135	21,920	8,124	21,713	3,906	165	1,014	1,705	1,022	1,279	2,245	569	300,020
1922	296,594	11,724	24,352	27,546	9,207	15,934	6,430	2,493	2,043	172	—3,807	1,778	589	567	396,222
1923	301,527	12,700	27,392	18,519	13,277	15,372	8,489	2,986	1,649	2,184	792	2,528	630	1,128	409,173
1924	319,103	—11,550	30,446	22,727	14,299	19,571	8,764	2,346	3,124	2,688	—807	3,178	944	1,370	416,203
1925	385,596	4,061	32,956	33,937	19,683	11,117	11,412	7,088	4,757	2,930	375	3,149	1,155	1,558	520,274
1926	499,981	84,865	34,240	22,775	20,229	18,125	9,309	6,529	9,021	2,498	2,670	4,046	1,299	1,870	617,957
1927	403,472	60,249	34,271	38,892	26,405	20,521	11,381	12,018	9,490	6,482	636	4,224	2,055	2,672	632,768
1928	407,372	4,846	36,498	37,855	30,447	25,621	12,433	15,134	8,430	7,958	2,243	4,418	3,178	3,138	599,771
1929	528,608	122,675	55,093	49,275	35,453	34,284	17,169	11,774	15,886	9,445	3,022	6,440	864	4,650	894,638
1930	458,036	120,069	68,503	45,488	28,793	33,039	18,639	16,387	5,354	10,635	2,924	7,710	2,400	4,468	822,445
1931	475,993	86,170	46,466	39,688	25,261	43,483	10,149	30,671	7,649	11,009	2,220	6,360	2,605	7,717	794,641
1932	393,814	44,086	42,506	45,121	20,917	56,027	14,469	30,637	12,576	9,519	2,851	7,262	4,359	9,444	693,618
1933	398,365	73,335	61,953	54,120	19,332	66,831	19,341	29,830	13,534	11,166	1,243	7,831	5,520	10,402	772,803
1934	439,172	158,482	49,560	59,330	28,439	69,905	21,398	47,271	9,642	9,115	3,758	12,418	6,900	10,999	926,389
1935	455,758	128,829	51,450	62,899	26,870	57,567	21,880	37,572	9,978	7,593	4,068	11,878	8,140	11,245	895,727
1936	475,359	—2,591	57,032	71,794	27,871	61,223	16,534	30,967	14,109	9,648	2,888	11,236	6,668	8,772	791,510
1937	592,394	92,707	59,871	98,170	36,088	62,311	24,733	30,462	19,164	14,970	4,343	4,680	2,400	13,063	1,055,356
1938	406,343	133,079	59,660	90,200	25,696	45,836	28,170	25,650	11,944	11,309	5,092	16,034	2,400	9,936	871,349
1939:															
May	45,390	7,531	4,646	8,413	3,006	4,438	1,573	2,000*	1,188	792	518	1,654	200*	618	81,967
June	33,951	8,439	4,649	8,190	2,423	3,067	1,992	2,000*	1,308	621	672	2,703	200*	487	70,702
July	36,932	4,040	4,282	8,437	3,164	3,668	1,350	1,000*	1,422	859	565	824	200*	412	67,155
Aug.	38,319	2,044	4,000*	....	2,033	3,145	1,500*	2,000*	2,182	952	651	1,546	200*	400*	58,972
Sept.	36,197	4,406	4,000*	....	2,639	9,254	1,500*	2,000*	875	108	222	1,200*	200*	...	63,572
Oct.	39,735	8,530	5,000*	....	5,787	2,749	1,500*	2,000*	1,235	519	653	1,200*	200*	...	69,589
Nov.	41,478	10,500*	5,000*	....	1,709	5,104	1,500*	2,000*	1,200*	667	613	1,200*	200*	...	71,504
Dec.	70,302	5,200*	5,000*	....	3,025	3,961	1,500*	2,000*	1,200*	1,035	1,827	1,200*	200*	...	94,702
1940:															
Jan.	71,565	450	5,000*	.....	5,047	4,540	1,500*	2,000*	1,200*	891	682	1,200*	200*	.....	.....
Feb.	41,797	7,500	5,000*	.....	3,508	5,241	....	.....	.....	694	495	1,200*	200*	.....	.....
Mar.	58,302	14,200	....	.....	3,062	6,057	....	.....	.....	.....	627	.....	.....	.....	.....
Apr.	70,135	16,400	....	.....	3,096	....	....	.....	.....	.....	.....	.....	.....	.....	.....
May	50,610	10,000	....	....	3,108	....	....	.....	.....	.....	.....	.....	.....	.....	.....
June	53,266	9,500	.....	.....	1,062	....	....	.....	.....	.....	.....	.....	.....	.....	.....
July	69,374	19,500	....	....	....	....	....	.....	.....	.....	.....	.....	.....	.....	.....
Aug.	72,613	21,250	....	....	....	....	....	.....	.....	.....	.....	.....	.....	.....	.....

a—Including gutta percha. b—Including balata. c—Re-exports not deducted in monthly statistics. d—Including some scrap and reclaimed rubber. e—Official statistics of rubber imports by Soviet Russia. f—Including Norway, Sweden, Denmark and Finland. g—United Kingdom and French exports to Spain except in years prior to 1925. h—French imports have been reduced in order to eliminate imports of gutta percha and to reduce to basis of net weight. [1]—United States imports of guayule are included in this compilation. *—Figure is provisional; final figure will be shown when available.

NOTE: ANNUAL FIGURES ARE MORE ACCURATE; THEY ARE REVISED AT THE END OF THE FOLLOWING YEAR.